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Geological Institute, Faculty of Science, University of Tokyo, Japan

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305. ON THE MIOCENE LUCINIDAE FROM THE MIZUNAMI GROUP, JAPAN*

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瑞浪層群産の中新世 Lucinidae：瑞浪・岩村両盆地の瑞浪層群より産した 6 種の Lucinidae に属する化石貝類について属及び種を検討し，特に古生態について考察した。また，*Wallucina* 属の一新種を記載した。 糸魚川 淳二

Introduction and Acknowledgements

In the inside zone of southwestern Japan, there are found scatterings of the Miocene strata that are assumptively representing the First Paleo-Setouchi supergroup (IKEBE, 1951) i. e. Mizunami, Isshi, Ayukawa, Tsuzuki and Tsuyama groups etc. Yielding rich faunas and floras, these strata are interesting subjects for the members of the Paleo-Setouchi research group. The Mizunami group, the type of the supergroup, was developed in three mutually connected basins, Kani, Mizunami and Iwamura in Gifu Prefecture. The present writer is studying the stratigraphy and paleontology of this group and he has partly reported the results.

This paper is the third result and prepared in view of taxonomic and paleoecological accounts of the Lucinid pelecypods from the Mizunami group. These are the interesting forms inasmuch as they are the indicators of various environments.

The following species are collected from the Mizunami group in the Iwamura and Mizunami basins.

Wallucina habei ITOIGAWA
Wallucina okumurai n. sp.
Pillucina (*Sydlorina*) *yokoyamai* (OUTKA)
Saxolucina (*Megaxinus*) *k-hataii* (OTUKA)
Lucinoma acutilineata (CONRAD)
Cavilucina (*Monitilora*) *kitamurai* (HATAI et NISIYAMA)

The writer is indebted to Prof. J. MAKIYAMA for his suggestions and revision of English. Thanks are also due to Dr. T. KURODA and Dr. T. HABE for informations about the taxonomic malacology.

Paleoecological notes

Some paleoecological aspects of these species were observed in field and laboratory considering the data of stratigraphy and fossil fauna. Although these data are not complete at present presumably overlooking minute species, the conclusion might not be very different from that based upon the more accumulated material.

Cavilucina (*Monitilora*) *kitamurai* (HATAI et NISIYAMA) and *Wallucina okumurai* n. sp. are found only in the Shukunohora sandstone associating *Miogypsina kotoi* HANZAWA, *Operculina complanata japonica* HANZAWA, *Aloidis*

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* Read June 28, 1956; received Apr. 28, 1956

nisataiensis OTUKA and *Turbo ozawai* OTUKA etc. Both valves of every individual of these two species are attached showing autochthonous origin in the sandy environment. The fauna of Shukunohora sandstone represents the warm sea waters and peculiar to this group. It seems that this two species inhabited in the warm and shallow waters with sandy bottom.

Wallucina habei ITOIGAWA is found in the sandstones as a member of *Dosinia-Nipponomarcia* fauna. It is indicating a sandy neritic environment, and the attached valves show also the autochthonous origin.

Pillucina (Sydlorina) yokoyami (OTUKA) is found in the marginal facies developed near the basement with the following species:

Nipponomarcia nakamurai IKEBE, *Venerupis siratoriensis* (OTUKA), *Nassarius simizui* OTUKA, *Turritella s-hataii* NOMURA.

Most probably this species shows the similar environment to that of *Wallucina habei* ITOIGAWA.

Saxolucina (Megaxinus) k-hataii (OTUKA) accompanies with *Vicarya yokoyamai* TAKEYAMA, *Vicaryella ishiiana* (YOKOYAMA), *Sanguinolaria minoensis* (YOKOYAMA), *Cyclina japonica* KAMADA and *Cerithium kaneharai* FUJITA and OGOSE etc. and indicates the sandy brackish environments.

Lucinoma acutilineata (CONRAD) is the common and important species in this district. Two different occurrences are known; the one being autochthonous showed by the attached valves is in the muddy and silty sediment and the other case being allochthonous is in the sandstone. In the former case, this species is a good indicator of an environment under a muddy inland sea.

Description of species

Family Lucinidae

Genus *Wallucina* IREDALE 1930

Wallucina habei ITOIGAWA 1955

Pl. 1, figs. 3a–b.

1955: *Wallucina habei* ITOIGAWA, *Mem. Coll. Sci., Kyoto Univ. Ser. B, Vol. 22, No. 2. Art. 1*, p. 139, pl. 6, figs. 1, 2.

Geological occurrence:–

1. Kubohara sandstone, Iwamura basin.
2. Togari formation, Mizunami basin.
3. Tsukiyoshi formation, Mizunami basin.

Localities:–

1. J 30111, Kamigiri, Iwamura-cho, Ena-gun, Gifu Prefecture.
2. J 40026, Nenga-hora, Togari, Mizunami City.

3–a. J 40041, Matsubora, Toki-cho, Mizunami City.

3–b. J 40049, Kujiri, Toki City.

Associated forms:–

1. *Dosinia nomurai* OTUKA, *Nipponomarcia nakamurai* IKEBE, *Clinocardium shinjiense* (YOKOYAMA), *Glycymeris minoensis* ITOIGAWA, *Euspira meisensis* MAKIYAMA, *Turritella s-hataii* NOMURA, *Nassarius simizui* OTUKA etc.
2. *Dosinia nomurai* OTUKA, *Nipponomarcia nakamurai* IKEBE, *Gibbula tukiyosiensis* (OYAMA et SAKA) etc.

3–a. *Vicaryella ishiiana* (YOKOYAMA), *Cerithium kaneharai* FUJITA et OGOSE, *Sanguinolaria minoensis* (YOKOYAMA) etc.

3–b. *Turritella s-hataii* NOMURA, *Euspira meisensis* MAKIYAMA, *Protorotella togariense* MAKIYAMA etc.

Wallucina okumurai ITOIGAWA n. sp.

Pl. 1, figs. 1, 2.

Shell small, suborbicular, as long as high, thin, moderately inflated, roundly produced anteriorly; antero-dorsal margin short, concave; postero-dorsal side slightly convex, gradually descending to posterior margin; anterior margin rounded; ventral side arched; beak small, prominent; sculpture consisting of fine regular concentric lamellae and obscure radiating striae; dorsal area more or less marked; lunule small, cordate, dissymetric; hinge plate narrowly long, delicate; cardinal and lateral teeth frail, well developed; inner margin denticulate; inner side with fine radiating striae.

Dimensions:- Height, 5 mm., length, 4.5 mm.

Holotype:- JC 1500001, Paratype:- JC 1500002.

Remarks:- This species is closely resembling *Wallucina habei* Itoigawa, 1955, but it is distinguished in having the thin and inflated shell with the fine concentric lamellae, and the narrowly delicate hinge plate. *Wallucina lamyi* Chavan, 1938 is another allied species but the present species has the thinner and more orbicular shell, and its hinge plate is more delicate with the fine and frail teeth.

This species is named in honor of late Mr. Kikuo Okumura who helped the writer in the field.

Type Locality:- River-side cliff of Shukubora valley about 100 m. SW of the bridge at S of Shukubora, Hiyoshi-cho, Mizunami City, Gifu Prefecture. (J 40020) (Iwamura, 35° 24′ 06″ N, 137° 16′ E)

Geological occurrence:- Shukunohora sandstone, Mizunami basin.

Associated forms:- *Miogypsina kotoi* Hanzawa, *Operculina complanata japonica* Hanzawa, *Aloidis nisataiensis* Otuka, *Cavilucina kitamurai* (Hatai et Nisiyama), *Turbo ozawai* Otuka, *Acteon ozawai* Otuka etc.

Genus *Pillucina* Pilsbry 1921

Pillucina (*Sydlorina*) *yokoyamai* (Otuka)

Pl. 1, figs. 4, 5.

1934: *Lucina yokoyamai* Otuka, *Bull. Earthq. Res. Inst. Tokyo Imp. Univ. Vol. 12*, p. 615, pl. 47, figs. 29-32.

1935: *Lucina* (*Lucinisca*) *yokoyamai* Otuka, *Jour. Fac. Sci. Imp Univ. Tokyo, Vol. 5*, p. 27, pl. 4, fig. 38.

Shell small in size, suborbicular, as long as high, moderately convex; beak small, pointed, turned inwards, touching, placed slightly back of dorsal margin; antero-dorsal margin short, concave, bluntly angled to subrounded anterior margin; postero-dorsal margin also short, nearly straight descending to subtruncated posterior margin; ventral margin regularly rounded, connecting both to posterior and anterior ends gradually; sculpture consisting of many radiating striae crossed by concentric incremental lines; radiating striae not divaricate, weak at middle part; concentrics fine, ocassionally strong; lunule ovate, deep, well marked; teeth of right valve consisting of a cardinal and 2 laterals; teeth of left valve consisting of 2 divaricating cardinals; inner side with fine radiating lines; muscular scar well-marked; inner margin finely crenulate.

Dimensions:- Height, 6 mm., length, 6 mm,

Remarks:- This species was described originally by Otuka from the lower Kadonosawa series (Miocene) as a species of the Genus *Lucina*. Otuka states the alliance with Dall's *Lucinisca*. Examined in detail, it is clarified that it has the characters of the Genus *Pillucina* and the Subgenus *Sydlorina* i. e. the teeth and its not divaricated sculpture. The murricate sculpture of the Genus *Lucinisca* is not at all seen in this species.

Geological occurrence:-

1. Kubohara sandstone, Iwamua basin.
2. Togari formation, Mizunami basin.
3. Tsukiyoshi formation, Mizunami basin.

Localities:-

1-a. J 30246, Nakanishi, Yamaoka-cho, Ena-gun, Gifu Prefecture.
1-b. J 30111, Kamigiri, Iwamura-cho, Ena-gun, Gifu Prefecture.
2. J 40026, Nenga-hora, Togari, Mizunami City.
3-a. J 40041, Matsubora, Toki-cho, Mizunami City.
3-b. J 40049, Kujiri, Toki City.

Associated forms:- 1-a. ***Barbatia kubara*** Itoigawa, ***Nipponomarcia nakamurai*** Ikebe, ***Venerupis siratoriensis*** (Otuka), ***Nassarius simizui*** Otuka, ***Protorotella depressa*** Makiyama, 1-b. same to the associated fauna-(1) of ***Wallucina habei*** Itoigawa, 2. same to the associated fauna-(2) of ***Wallucina habei*** Itoigawa, 3-a. same to the associated fauna-(3-a) of ***Wallucina habei*** Itoigawa, 3-b. same to the associated fauna-(3-b) of ***Wallucina habei*** Itoigawa.

Genus *Saxolucina* Stewart 1930

Saxolucina (Megaxinus) k-hataii (Otuka)

Pl. 1, fig. 8.

1934: *Lucina k-hataii* Otuka, *Bull. Earthq. Res. Inst. Tokyo Imp. Univ., Vol. 12*, p. 614, pl. 47, figs. 5, 6.

1938: *Lucina (Miltha) k-hataii* Otuka, *Jour. Fac. Sci. Imp. Univ. Tokyo, Vol. 5*, p. 27, pl. 4, fig. 38.

Original description:- Shell rather small, more or less thin, with the surface more or less irregularly and concentrically lamellated; anterior end longer, attenuated; posterior end more plump, obscurely vertically truncated; beak low pointed; lunule small, crescentric in form, deeply impressed, with fine, close, more or less irregularly crenated striae parallel to the hinge margin; postero-dorsal area more or less distinct, extending to the postero-ventral margin. Ligament impressed, broadly curved.

Remarks:- The remarkable features of this species are as follows;

1) very weak or obsolete teeth, 2) well marked, dissymetric and deep lunule, 3) well marked posterior area, 4) anteriorly 2 radiating lines, 5) smooth inner margin.

This species belongs to the section *Megaxinus* under the Genus *Saxolucina* on account of the above noted features. It is distinguished from the Genus *Miltha* by the weak or obsolete teeth.

Geological occurrence:- Tsukiyoshi formation, Mizunami basin.

Localities:-

1. J 40008, Shobasama-hora, Tsukiyoshi, Mizunami City.
2. J 40041, Matsubora, Toki-cho, Mizunami City.

Associated forms:- ***Vicarya yokoyamai*** Takeyama, ***Vicaryella ishiiana*** (Yokoyama), ***Cerithinm kaneharai*** Fujita et Ogose, ***Cyclina japonica*** Kamada, ***Sanguinaloria minoensis*** (Yokoyama) etc.

Genus *Lucinoma* Dall 1901

Lucinoma acutilineata (Conrad)

Pl. 1, figs. 9-12.

1849: *Lucina acutilineata* Conrad, *U. S. Expl. Exped. Vol. 10, Geol.* p. 725.

1909: *Phacoides acutilineata*, Dall, *U. S. G. S. Prof. Paper. No. 59*, p. 116, pl. 12, fig. 6.

1931: *Phacoides (Lucinoma) acutilineata*, Etherington, *Univ. Calif. Publ. Geol. Vol. 20*, p. 76, pl. 4, fig. 5.

Remarks:- This is one of the common species in the First Paleo-Setouchi supergroup. The limits of this species have been discussed by American and Japanese authors.

The specimens at hand from the Mizunami group are ill-preserved so that determination is difficult, but it seems to fall within the limit of *Lucinoma acutilineata* (Conrad) seeing general features. Further investigation will be made when sufficient material is supplied.

It is distinguished from the Recent *Lucinoma annulata* (Reeve) from Kagoshima by having the compressed shell, short lunule and the sculpture which consists of regularly spaced, periodic, concentrically lamellar threads and fine intercalary striae.

The similar examples are collected from the First Paleo-Setouchi supergroup as follows;

Isshi group (Kaisekizan formation), Awa formation (Ikegata member, Hiramatsu member, Makino member), Fujiwara group (Toyoda formation), Yamabe group, Tsuzuki group (Kaya mudstone, Shiodani sandstone), Tomikusa group.

Geological occurrence:-

1. Yamanouchi formation, Mizunami basin.
2. Maki siltstone, Iwamura basin.
3. Kubohara sandstone, Iwamura basin.

Localities:-

1. J 40028, Togari, Mizunami City.
2. J 30168, Hachiyato, Agi-mura, Ena-gun, Gifu Prefecture.
3. J 30111, Kamigiri, Iwamura-cho, Ena-gun, Gifu Prefecture.

Associated forms:- 1. *Acila submirabilis* Makiyama, *Cultellus izumoensis* Yokoyama, *Macoma* sp., *Patinopecten* sp. etc. 2. *Nuculana pennula* (Yokoyama), *Venericardia siogamensis* Nomura etc. 3. same to the associated fauna-(1) of *Wallucina habei* Itoigawa.

Genus *Cavilucina* P. Fisher 1887

Cavilucina (*Monitilora*) *kitamurai* (Hatai et Nisiyama)

Pl. 1, figs. 6, 7.

1949: *Codakia kitamurai* Hatai et Nisiyama, *Jour. Paleont. Vol. 23*, p. 91, pl. 24, figs. 5, 6.

Remarks:- This species is described by Hatai and Nisiyama as a species of the Genus *Codakia*. Examining many examples from the type locality, it is concluded that this species does not belong to the Genus *Codakia*, but to the Genus *Cavilucina*. The reason is as follows;

1) The shell is moderately inflated.

2) The sculpture of this species consists of fine, regular and concentric lamellae, and the fine radiating threads in the interspaces.

3) The teeth are feeble and ocassionally obsolete.

The Genus *Cavilucina* is divided into three Subgenera: *Cavilucina* s. s., *Monitilora* and *Barbierella*.

This species falls to the Subgenus *Monitilora* with the features of sculpture, teeth and lunule.

Hatai and Nisiyama noted the calcareous and granular material deposited on the inner surface. This appears to be a specific character, inasmuch as shown by the majority.

This record of the occurrence of *Monitilora* is most probably the first in Japan.

Geological occurrence:- Shukunohora sandstone, Mizunami basin.

Locality:- J 40020, Shukubora, Hiyoshicho, Mizunami City.

Associated forms:- Same to the one of *Wallucina okumurai* n. sp.

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Explanation of Plate 1

Fig. 1. *Wallucina okumurai* ITOIGAWA n. sp. Holotype, Reg. No. JC1500001. Left valve, ×3. Loc. Shukubora, Hiyoshi-cho, Mizunami City, Gifu Prefecture.

Fig. 2. *Wallucina okumurai* ITOIGAWA n. sp. Paratype, Reg. No. JC1500002. Right valve, × 3. Loc. Same as above.

Figs. 3a-b. *Wallucina habei* ITOIGAWA, a. Left valve, × 3, b. Internal view of 3a, × 3. Loc. Kamigiri, Iwamura-cho, Ena-gun, Gifu Prefecture.

Fig. 4. *Pillucina (Sydlorina) yokoyamai* (OTUKA), Right valve, × 3. Loc. Nakanishi, Yamaoka-cho, Ena-gun, Gifu Prefecture.

Fig. 5. *Pillucina (Sydlorina) yokoyamai* (OTUKA), Right valve, × 3. Loc. Same as above.

Fig. 6. *Cavilucina (Monitilora) kitamurai* (HATAI et NISIYAMA), Right valve, × 1. Loc. Shukubora, Hiyoshi-cho, Mizunami City, Gifu Prefecture.

Fig. 7. *Cavilucina (Monitilora) kitamurai* (HATAI et NISIYAMA), Left valve, × 1. Loc. Same as above.

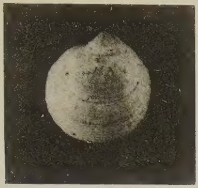
Fig. 8. *Saxolucina (Megaxinus) k-hataii* (OTUKA), Right valve, × 1. Loc. Matsubora, Toki-cho, Mizunami City, Gifu Prefecture.

Fig. 9. *Lucinoma acutilineata* (CONRAD), Mold of Left valve, × 1. Loc. Hachiyato, Agi-mura, Ena-gun, Gifu Prefecture.

Fig. 10. *Lucinoma acutilineata* (CONRAD), Right valve, × 1. Loc. Same as above.

Fig. 11. *Lucinoma acutilineata* (CONRAD), Left valve, × 1. Loc. Ebisuba, Haibara-cho, Yamabe-gun, Nara Prefecture.

Fig. 12. *Lucinoma acutilineata* (CONRAD), Mold of Right valve, × 1. Loc. Hachiyato, Agi-mura, Ena-gun, Gifu Prefecture.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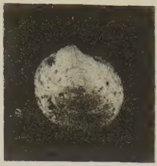
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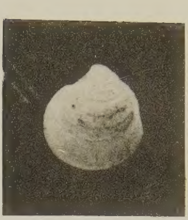
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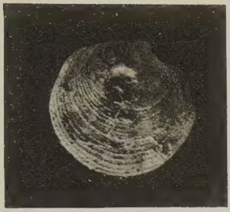
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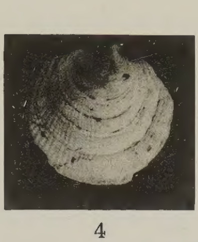
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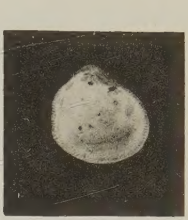
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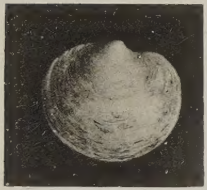
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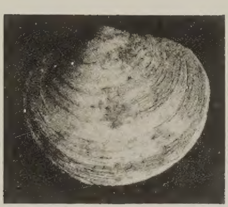
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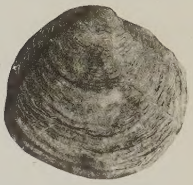
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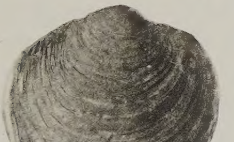
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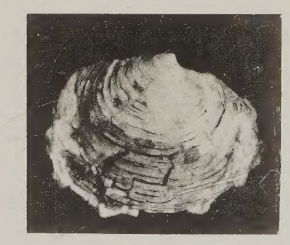
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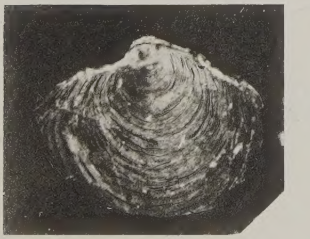
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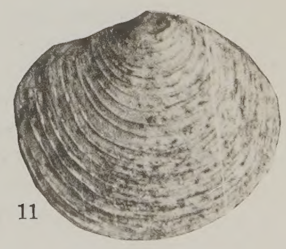
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306. BRACHIOPODA FROM THE DAISHAKA AND TSURUGASAKA FOSSIL ZONES, MINAMI-TSUGARU-GUN, AOMORI PREFECTURE.*

JIRO KOTOH

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青森県大釈迦油田，大釈迦及び鶴ヵ坂化石帯に於ける腕足類に就いて：層位学的に，又，有孔虫類及び軟体類より，Pliocene と考えられる大釈迦及び鶴ヵ坂化石帯に産出せる腕足類 6 種 *Hemithyris psittacea* (GMELIN), *Coptothyris adamsi* (DAVIDSON), *Terebratalia coreanica* (ADAMS and REEVE), *T. gouldi* (DALL), *Terebratulina joponica* (SOWERBY), *Laqueus rubellus* (SOWERBY) に就いて考察し，これ等を含有せる化石帯の堆積環境を論じたものである。　古 藤 次 郎

The Brachiopoda dealt with in this article are from two localities, one (DS-149) belonging to the Daishaka fossil zone, and the other (DS-140) to the Tsurugasaka fossil zone. The fossils were collected by the writer during the summer of 1951 on the occasion of geological field work for the Nippon Mining Company.

The Daishaka and Tsurugasaka fossil zones are exposed in the vicinities of the two mentioned localities as shown in the text-figure. At Daishaka, the fossil zone consists of pebbly or cobbly, coarse to medium grained sandstone with mudstone breccia and intercalates thin mudstone layers. This zone is in fault contact with the adjacent formations. At Tsurugasaka, the fossil zone consists of granule conglomerate, coarse to medium grained sandstone and intercalates several thin mudstone layers. Here the coarse sediments occur in the lower part and the fine grained ones in the upper.

The two fossil zones, from their stratigraphic position, faunal content and lithological characters, are regarded as corresponding to the Shibikawa formation of Akita Prefecture, and to be of Pliocene age.

Here I wish to record my thanks to Professors K. HUZIOKA, T. INOUE and T. TAKAYASU of the Akita University for their encouragement, and to Mr. T. MIYAJIMA of the Nippon Mining Company for his interest taken in the work. Thanks are also due to Dr. K. HATAI of the College of Education, Tohoku University, for kindly looking over the manuscript.

Leaving the micro-fauna for another oppotunity, the brachiopods discriminated are:

	Daishaka	Tsurugasaka
Hemithyris psittacea (GMELIN)	+	+
Coptothyris adamsi (DAVIDSON)	+	+
Terebratulina japonica (SOWERBY)		+
Terebratalia coreanica (ADAMS & REEVE)	+	+
Terebratalia gouldi (DALL)		+
Laqueus rubellus (SOWERBY)		+

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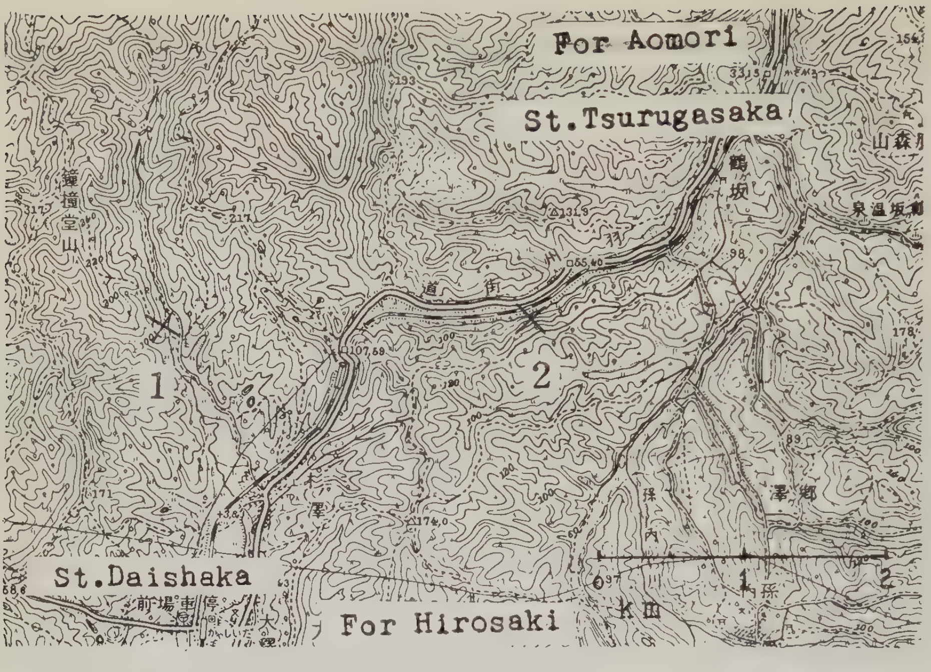
* Read Sept. 27, 1952; received May 7, 1956.



Text-figure. Showing the precise localities: 1 ......Daishaka fossil zone, and 2 ...... Tsurugasaka fossil zone.

Of the above mentioned species, those from Daishaka are of small size and few in individual number, while those from Tsurugasaka are of larger size and common in individual number.

From Daishaka, S. Nomura and K. Hatai (1935) have reported the occurrence of *Hemithyris psittacea* (Gmelin) and *Terebratalia coreanica* (Adams and Reeve).

1. *Hemithyris psittacea* (Gmelin). This species is rare in the Daishaka fossil zone, where it occurs only as broken or isolated valves. In the Tsurugasaka fossil zone it is found commonly either as isolated or intact valves. In living state, this species inhabits the seas of the northern hemisphere, where it is found from the tidal zone down to about 167 meters. It prefers a clean coarse sea bottom.

2. *Coptothyris adamsi* (Davidson). Although this species was found in both fossil zones, each localities provided only a single specimen. The size of the specimen measured about 7.2 mm in width, 6.8 mm in length and 3.8 mm in thickness; they have about 18 radial ribs in the middle part of the ventral valve of the Tsurugasaka specimen and about 14 of the same in the Daishaka specimen. This species is known to inhabit a sea bottom consisting of fine to coarse grained material providing it not be very muddy. The depth to which this species is known to extend at present, is from the tidal zone to about 37 fathoms, and is one of the most common species of Brachiopoda known from northern Japan. This monotypic genus is common in the tranquil waters of Mutsu Bay, Aomori Prefecture, but becomes less common in Matsushima Bay, Miyagi Prefecture, and by going

still further south, the number of individuals is much decreased, and at Onahama Bay in the southern part of Fukushima Prefecture, collecting is difficult. Therefore, judging from the frequency of occurrence, size of shell and type of radial ribs, it seems that the types of these brachiopods resemble those in Mutsu Bay, the thermal conditions during Daishaka and Tsurugasaka zones was cooler than that of present day Matsushima Bay, the environmental conditions correlating with the Mutsu Bay, but deeper.

3. *Terebratulina japonica* (Sowerby). This species is commonly found in the Tsurugasaka fossil zone, and the ribs of the younger specimens are rough and distinct. In living state it is known to be distributed entirely around Japan and has been recorded from depths of 75–336 meters on the continental shelf. This species seems to prefer a sandy sea bottom.

4. *Terebratalia coreanica* (Adams and Reeve). This species is represented by only fragments of the isolated and broken valves of both valves, but of different individuals. The specimens (restored) are smaller than those now living in Mutsu Bay, Aomori Prefecture. This common shallow water brachiopod is related to bottom control, but thermal barriers seem to have but little effect to its distribution. It ranges from 44–296 meters on the continental shelf of Japan where the predominating bottom material consists of fine sandy mud.

5. *Terebratalia gouldi* (Dall). This species is very abundant in the Tsurugasaka fossil zone. In living state, this species inhabits on bottoms consisting of mud within the range of 60 fathoms to about 612 meters on the continental shelf.

6. *Laqueus rebellus* (Sowerby). This species is abundant, but generally occurs as broken and isolated valves. Partaking to a sea bottom consisting of fine to coarse materials, this species has a depth range of 40–499 meters in the seas around Japan.

These both fossil zones must be recognized as the massing type of the so called "*Sweeping*" accumulation in the oceanic shallow water. While the flowings of the wide spread may not be considered because of the species and the physical conditions that the fossils are derived from them. They may be seemed as the para-autochthonous fauna being accompanied with the allochthonous one, and therefore, the sedimentary enviroments of these zones may be considerable in general.

Namely, from the above mentioned data the Daishaka fossil zone can be interpreted as containing a brachiopod fauna which suggests, (a) accumulation in a sea with a depth probably less than 80 meters, which is the most favorable minimum depth for the brachiopoda it contains, (b) the thermal conditions may be compared with present day Aomori Bay but were deeper than that and, (c) the paucity of species seems to indicate that prevailing conditions were not favorable for the flourishing of brachiopoda. The Tsurugasaka fossil zone is characterized by, (a) an assemblage which accumulated in a sea with a depth probably between 120–170 meters, (b) the thermal conditions were similar to that of the Daishaka fossil zone but deeper, (c) the assemblage consists of species which take to a muddy bottom and those which flourish on a sandy sea bottom, (d) and finally the geological age may be Pliocene from the absence of extinct forms, the evidence afforded by the other fauna of Foraminifera and Mollusca etc., and by the stratigraphic position of the fossil zones.

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307. FOSSIL AND RECENT SPECIES OF THE GENUS *PANOMYA* FROM JAPAN*

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本邦産化石並に現生 *Panomya* 属について：本邦産 *Panomya* 属については，これまで現生種4種，化石種2種が報告されていたが，これらについて再検討し，新に1新種を記載した．なお本邦における *Panomya* 属の地質時代ならびに地理的分布を検討した． 菅野三郎

Introduction

In this paper is given a brief summary of the Japanese fossil and Recent species of the Genus *Panomya* and a description of a new species of fossil *Panomya*.

The writer wishes to express his thanks to Profs. Haruyoshi FUJIMOTO and Kotora HATAI of our Institute, for their guidance and encouragement. Thanks are also due to Messrs. Shigeru AOKI and Hiromi TAKAI of our Institute, for kindly offering some specimens to the writer. The writer is also indebted to Dr. Isao TAKI, Natural Science Museum, and Mr. Sunao OGOSE, Tokyo University, for their kind information on the bibliography.

Review of the previous works

The following fossil and Recent species of the geuns *Panomya* have been reported from Japan.

1. *P. ampla* DALL, 1898, *Trans. Wagner Inst. Sci., vol. 3, pt. 4,* p. 883.
2. *P. turgida* DALL, 1916, *Proc. U. S. Nat. Mus., vol. 52, no. 2183,* p. 416.
3. *P. beringiana* DALL, 1916, *Ibid.,* p. 416.
4. *P. nipponica* NOMURA and HATAI, 1935, *Saito Ho-on Kai Mus., Res. Bull., no. 5,* p. 20, pl. 1, figs. 7a-b.
5. *P. simotomensis* OTUKA, 1934, *Bull. Earthq. Res. Inst., no. 12, pt. 3,* p. 621, pl. 44, figs. 66a-b.
6. *P. izumo* NOMURA and HATAI, 1938, *Japan. Jour. Geol. Geogr., vol. 16, nos. 1-2,* p. 6, pl. 1, figs. 2a-b.

Nos. 1-4 in the above list are living species and the remaining ones are known only as fossil, but recently T. HABE (1955) lumped such Japanese Recent species as "*P. turgida* DALL" and *P. nipponica* NOMURA and HATAI into *P. ampla* DALL.

Distribution and Ecology

The present genus is rather rare in Japan both living and fossil. However, the geological distribution of its living species seems to be restricted to the Pacific coast of northern Honshu (the main island of Japan), the Okhotsk and the Bering Seas.

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* Read June 20, 1956; received June 21, 1956.

According to T. KURODA and T. HABE (1952), the Recent species are distributed along the Pacific as follows;

P. ampla DALL N. lat. 50°–68°, "*P. turgida* DALL" N. lat. 43°–56°, *P. beringiana* DALL N. lat. 39°–64°, *P. nipponica* NOMURA and HATAI N. lat. 39°.

Thus, from the known geographical distribution it may be said that the present genus is boreal in habitat.

The living species of *Panomya* are usually buried in muddy bottoms comparatively offshore in cold water, and are not known to bore into rocks.

The fossil species of *Panomya* in Japan date back to the Miocene of Izumo, Shimane Prefecture, (N. lat. 35° 26′), which is the known southern limit in Japan, the Miocene of Shiogama, Miyagi Prefecture (N. lat. 38° 14′ 48″), the Miocene of Kurosawa, Akita Prefecture (N. lat. 39° 14′ 35″) and the Pliocene of Suenomatsuyama, Iwate Prefecture (N. lat. 40° 17′ 30″). Accordingly, the distribution of the fossil species is apparently more south than that of the Recent one. The fossil species of *Panomya* are usually entombed in fine-grained sandstone or mudstone.

The present genus first appears in the Inferior Oolite in the United States of America, Europe and India. However, so far as Japan is concerned, the oldest record seems to be in the Miocene of Izumo and Shiogama, *P. izumo* and *P. simotomensis* occur. The next younger occurence is in the Pliocene of the Suenomatsuyama and the Nakamura mudstone (S. KANNO, 1955) where *P. simotomensis* and *P. gigantea* KANNO, n. sp. occur. No Pleistocene species of *Panomya* have been reported from Japan.

Systematic Description

Family Hiatellidae

Genus *Panomya* GRAY, 1853

Panomya GRAY, 1853, *Figures of Molluscus Animals. vol. 5*, p. 29.

Panomya GRAY, H. and A. ADAMS. 1858, *The Genera of Recent Mollusca, vol. 2*, pp. 351, 659.

Panopaea MENARD, F. STOLICZKA, 1871, *Palenontologia Indica, ser. 4. vol. 3*, p. 85.

Panopaea, MENARD, L. REEVE, 1873, Monograph of the Genus *Panopaea*, pl. 5, fig. 7.

Panomya MENARD, S. P. WOODWARD, 1880, Manual of the Mollusca, pp. 492–493.

Panomya GRAY, W. H. DALL, 1898, *Trans. Wagner Inst. Sci. Phil., vol. 3, pt. 4*, p. 832.

Panomya GRAY, T. HABE, 1952, Genera of Japanese Shells, *no. 3*, p. 233.

Genotype: Panopaea norvegica SPENGLER, Recent.

According to W. H. DALL (1898), the genus *Panomya* has the following characters; "Shell solid, large, irregular, with a single cardinal tooth under the beak in each valve; the pallial line of unconnected, rounded impressions; the animal larger than the shell, with large, united siphons, diverging slightly at the tips and covered with a wrinkled coriaceous epidermis."

Remarks: The present genus is somewhat related to the genus *Mya* LINNÉ 1758, but it can be distinguished therefrom by having the pallial line of unconnected, rounded impressions, a single cardinal tooth in each valve, no chondrophre, and external ligament. The present genus is also related to the genus *Panope* MENARD, 1807, but it can be distinguished from the latter by having a medial depressed area, radial bounding folds, more shorter and non-cylindrical shell, and the pallial line of unconnected, rounded impressions.

According to F. STOLICZKA (1871),

the present group had been referred to the genus *Glycimeris* of KLEIN (1753, Tent. Meth., p. 130) based upon the Norwegian species. Subsequently, LAMARCK struck with the pecular characters of BRON's *Mya glycimeris* (=*Chama glycimeris* ALDVAND), proposed a new genus *Glycimeris* in 1799. However, a few years back, when MENARD (1807) proposed his name *Panopaea*, LAMARCK dropped the name *Glycimeris*. The name *Panopaea* was proposed by MENARD in 1807 for a Tertiary species, which he calls *P. Faujasi*, but which has been proved to be identical with the Recent species *Panopaea glycimeris* of BRON, or *Panopaea Aldvandi* of MENARD.

H. and A. ADAMS (1858) referred these species to the genus *Glycimeris*, retaining the name *Panopaea* for *P. norvegica* of SPENGLER. J.E. GRAY (1853) defined the genus *Panomya* and designated *Panopaea norvegica* SPENGLER as the type.

According to W.H. DALL (1898), MENARD published a separate of his paper on *Panope*, dated January, 1807, in which the name ended with the single vowel "e".

Thus, so far as the generic name is concerned, LANARCK's genus *Glycimeris* (1799, non KLEIN 1753) seems perfectly in accordance with our present system of nomenclature. However, it is very confusable because of Da COSTA's generic name *Glycymeris*, 1778, which is based upon a taxodont mollusc. Thus, the generic name *Panope* as established by MENARD in 1807 should be regarded a substitute for *Glycimeris* LAMARCK.

Panomya ampla DALL, 1898

Panomya ampla DALL, 1898, *Tran. Wagner Free Inst., vol. 3,* p. 883.

Panomya ampla, OLDROYD, 1924, *Stanf. Univ. Publ., Geol. Sci., vol. 1, no. 1,* p. 207, pl. 10, fig. 3.

Panomya ampla, ABBOTT, 1954, Amer. Sea shells, p. 454.

Panomya ampla, HABE, 1955, *Publ. Akkeshi Mar. Biol. Sta., no. 4,* p. 21, pl. 5, figs. 3–4.

Panope (Panomya) ampla, GRANT and GALE, 1931, *Mem. San Diego Soc. Nat. Hist., vol. 1,* p. 426, pl. 21, figs. 10a–b.

Panomya arctica turgida, KINOSHITA, 1937, *Rep. Fish. Surv. Hokkaido Fish. Exp. Sta., no. 41,* p. 30, pl. 9, fig. 53.

Panomya turgida, HABE, 1952, Gen. Japan. Shell, *no. 3,* p. 233, figs. 606, 607.

Panomya nipponica NOMURA and HATAI, 1935, *Saito Ho-on Kai Mus. Res. Bull., no. 5,* p. 20, pl. 1, figs. 7a-b.

Remarks: The so-called Japanese species *Panomya ampla*, *P. turgida* and *P. nipponica* are merely transitional forms as pointed out by T. HABE (1955). These three forms seem to be local or varietal forms of a single species. Evidently, the figures by various Japanese workers closely resemble one another (see text-figure 1).

Distribution: North of N. lat. 39° along the Pacfic coast of Japan, Okhotsk Sea and Aleutian Islands.

Panomya beringiana DALL, 1916

Panomya beringiana DALL, 1916, *Proc. U.S. Nat. Mus., vol. 32, no. 2183,* p. 416.

Panomya arctica turgida, CLARK, 1932, *Bull. Geol. Soc. Amer., vol. 43,* pp. 823, pl. 17, figs. 6, 9.

Remarks: The characteristic features of this species are thin, less cylindrical, large, and rather shorter shell. Length, 130 mm; height, 80 mm; diameter, 50 mm.

Distribution: North of N. lat. 39° and eastern Bering Sea.

Panomya simotomensis OTUKA, 1934

Panomya simotomensis OTUKA, 1934, *Bull.*

Earthq. Res. Inst., vol. 12, pt. 3, p. 621, pl. 49, figs. 66a-b.

Panomya simotomensis, NOMURA, 1935, *Saito Ho-on Kai, Mus., Res. Bull., no. 6,* p. 223, pl. 16, fig. 12.

Panomya simotomensis, OTUKA, 1941, *Jour. Japan. Assoc. Petrol. Tech., vol. 9, no. 2,* p. 153, fig. 1, on p. 148.

Remarks: The present species is a rather small type in the genus. This is characterized by the angle of the radial folds which are about 45°, and the beaks being situated at the anterior third of the shell.

Distribution: Shimotomai, Nidatori, all in the vicinity of Fukuoka-machi in Iwate Prefecture; Chiganoura, Shiogama-shi in Miyagi Prefecture; Naka-Nango, Sannai-gun, in Akita Prefecture.

Geologic range: Middle Miocene-Lower Pliocene.

Panomya izumo NOMURA and HATAI, 1938

Panomya izumo NOMURA and HATAI, 1938, *Japan. Jour. Geol. Geogr., vol. 16, nos. 1–2,* p. 6, pl. 1, figs. 2a–b.

Remarks: This species is distinguished from *P. simotomensis* OTUKA, by its higher and shorter shell outline, and the beak which situated more central in position than the latter. Moreover, this species closely resembles DALL's *P. ampla* in the quadrate shell outline, but precise comparsion is difficult owing to the insufficient number of specimens at hand.

Distribution: Fujina, Tamayu-mura, Yatuka-gun in Shimane Prefecture.

Geologic range: Miocene.

Panomya gigantea KANNO, n. sp.

Pl. 2, Figs. 1, 2a–b.

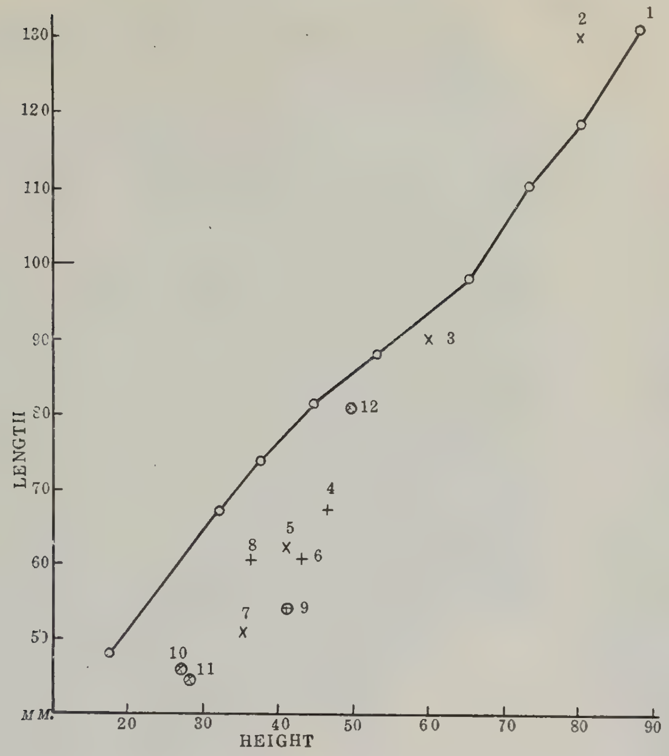
Shell large, rectangular in outline, inflated, gaping widely behind; anterior broadly rounded; posterior subvertically truncated; ventral margin almost straight, being parallel with the postero-dorsal margin. Beak situated at about 4/10 from the anterior, rather small, somewhat swollen, turned-in and directed forwardly, not touching one another. Surface ornamented with concentric, irregular undulations or rude concentric lines of growth, and the whole surface with short, irregular, minor striations; medial portion of valves depressed and bounded by two radial folds, of which the anterior one is almost vertical to the ventral border; angle of these two folds is about 40°. Inner surface and hinge not observed.

Dimensions (in mm):

Reg. No.	Length	Height	Thickness	Valve	Type
5600	130.5	85.5	25.0	Right	Holotype
5601	ca. 137.0	98.0	—	Intact	Paratype
5602	ca. 112.0	ca. 76.0	ca. 50.0	〃	〃, deformed specimen

Remarks: Two specimens with both valves intact and three single valves were examined.

This species is easily distinguished from such fossil and Recent species as *P. simotomensis, P. izumo,* and *P. ampla* by its extremely larger and higher shell (see text-figure 1). The present species, so far as the form ratio is concerned, rather resembles *P. beringiana* and *P. turgida.* The other species hitherto reported from Japan seem to be allied



Text-figure 1. Graph showing the form ratio of *Panomya gigantea* KANNO, n. sp., and the known fossil and Recent species of genus *Panomya.*

1. *P. gigantea* KANNO, n. sp.
2. *P. beringiana* DALL
3. *P. turgida* DALL
4. *P. turgida* of KINOSHITA
5. *P. ampla* of GRANT and GALE
6. *P. ampla* of HABE
7. *P. ampla of* OLDROYD
8. *P. nipponica* NOMURA and HATAI
9. *P. izumo* NOMURA and HATAI
10. *P. simotomensis* OTUKA
11. *P. simotomensis* of NOMURA
12. *P. simotomensis* of OTUKA from Naka-Nango.

to the Aleutian species, *P. ampla.*

The present species occurs rather rarely from the Pliocene Nakamura mudstone which is composed of grayish, pumiceous sandy mudstone. The new species occurs in associated with ***Patinopecten*** sp., ***Fulgoraria*** sp., and ***Echinarachnius*** sp. The specimens with both valves intact are buried in the strata in their natural position. From such evidence, it is inferred that the present species was not transported to its site of burial, therefore, it may indicate the thermal conditions of sea in which it lived. The writer considers that the molluscan fauna of the Nakamura mudstone indicates cold water. These facts perfectly agree with the thermal conditions indicated by the Tatunokuchi fauna (S. NOMURA, 1938).

Reg. No. 5600 (Holotype), 5601 and 5602 (Paratype).

Locality: Railway-side, about 400 meters south of Komagamine station, Shinchi-machi, Soma-gun, Fukushima Prefecture.

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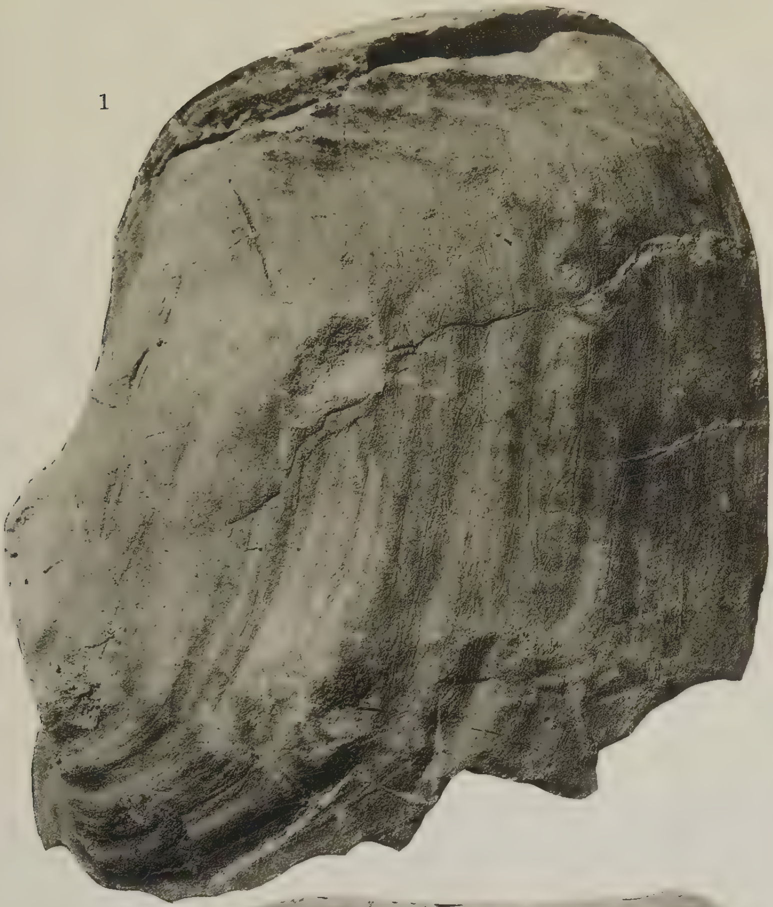
Explanation of Plate 2

(All figures in natural size)

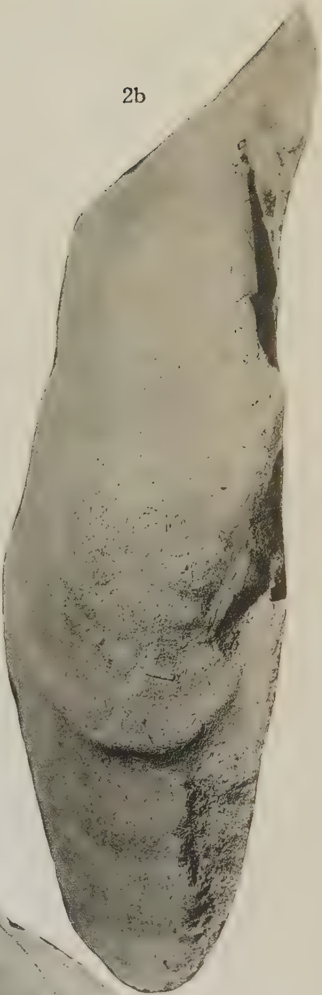
Fig. 1 *Panomya gigantea* KANNO, n. sp., paratype.
A left valve showing surface ornamentation.

Figs. 2a–b. *Panomya gigantea* KANNO, n. sp., holotype.
a. Right valve, surface more or less worn.
b. Apical view of the same.

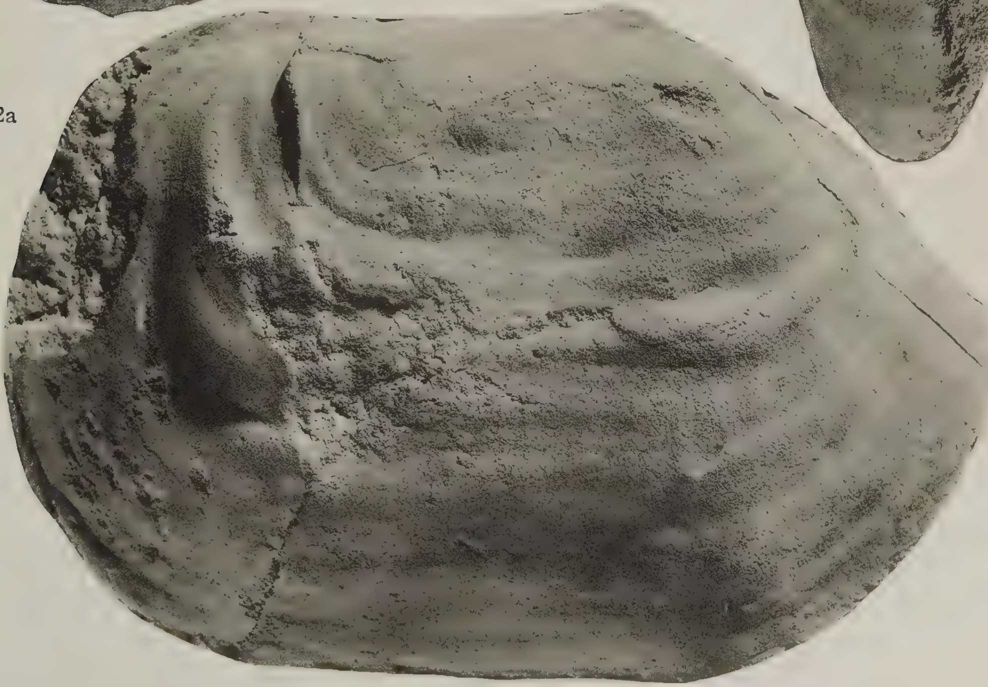
1



2b



2a



S. AOKI photo.

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 25, pp. 17—20, Pl. 3, April 30, 1957

308. TWO CARBONIFEROUS CORALS FROM OKAYAMA PREFECTURE*

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and

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岡山県の石炭紀珊瑚二種： 岡山県新見（ニイミ）市，土橋（ツチハシ），小字新屋原（ニイヤバラ）産の *Amygdalophyllum giganteum* (YABE et HAYASAKA) と新見市，佐伏（サウシ），小字森国（モリクニ）産の *Clisaxophyllum awa* MINATO subsp. *atetsuense* subsp. nov. を記載する。前者の時代については疑問の点があるが，ともに石炭紀中葉のものとみなす。

湊　正雄・中沢圭二

Amygdalophyllum giganteum (YABE et HAYASAKA) and *Clisaxophyllum awa* MINATO subsp. *atetsuense* nov. are described. The former was newly found in a limestone developing at Niiyabara, Tsuchihashi, Niimi City, Okayama prefecture, while the latter was collected from the tufaceous limestone which crops out near Morikuni, Niimi City, Okayama prefecture.

Description of Species

Amygdalophyllum giganteum

(YABE et HAYASAKA)

Pl. 3, Figs. 1, 1a, 2.

1924. *Echigophyllum giganteum*, HAYASAKA: On the Anthracolithic limestone, etc., *Sci. Rep. Tohoku Univ., ser. 2, Vol. 8, No. 1*, p. 20, pl. 4, Figs. 5, 6, 7. (On the plate there were misnumbered as 9, 10 and 11, respectively.)

1939. *Amygdalophyllum giganteum*, HAYASAKA: On the identity of *Echigophyllum* YABE et HAYASAKA (1924) and *Amygdalophyllum* DUN and BENSON (1920) etc., *Jour. Geol. Soc. Japan, Vol. 46*, p. 539.

1955. *Amygdalophyllum giganteum*, MINATO: Japanese Carboniferous and Permian corals. *Jour. Fac. Sci., Hokkaido Univ., ser. 4, Vol. IX, No. 2*, p. 149, pl. 17, Fig. 9; text-fig. 16.

It is far from doubtful that the present specimens now in concern are wholly conspecific with *Amygdalophyllum giganteum* (YABE et HAYASAKA) described and figured by HAYASAKA from the Carboniferous limestone of Omi district.

The writers have directly compared them with the holotype specimen now deposited at the Inst. Geol. and Palaeont., Tohoku Univ., Sendai.

Echigophyllum giganteum was first established by YABE and HAYASAKA based on the coral specimens derived from the limestone of Omi district, Niigata prefecture. This species, however, was later transferred into the genus *Amygdalophyllum* by HAYASAKA who claimed the generic identify of *Echigophyllum* with *Amygdalophyllum.* Thus the generic name *Echigophyllum* has been abandoned.

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* Read June 20, 1956; received June 25, 1956

The present senior author once followed HAYASAKA's view with slight doubt, and is now of the same opinion.

The columella of *Amygdalophyllum giganteum* is observed to be composed of numerous lamellar tissues, a very obscure median plate-like structure and septel lamellae-like tissues. The mentioned encircling lamellar tissues in the transverse section are never the usual axial tabellae.

In the specimens presently at hand, the columella is consisting of numerous concentric lamellar tissues, and less numerous septal lamellae-like structures, besides the obscure median plate, although the concentric lamellar tissues are occasionally discontinuous and interrupted by a twisting crack due to the deformation of the specimens.

The concentric lamellar tissues in the transverse sections appear as a tabellae-like strucutre in the longitudinal section; they are steeply ascending towards the imaginary median plate.

However, in the usual species of genus *Amygdalophyllum* including the genotype, the concentric lamellar structure is not so conspicuous in the transverse section of the columella as in the present specimens and in the holotype of *Amygdalophyllum=Echigophyllum giganteum.* Thus the structure of the columella in *Amygdalophyllum giganteum* must be regarded to be much different from that of the usual species of *Amygdalophyllum.*

Furthermore the dissepiments of the present specimens as well as those of the holotype specimen of *Amygdalophyllum giganteum* are quite characteristic, in the pattern of their arrangement.

The dissepiments of this species, especially near the outer wall are arranged in neither concentric nor angulo-concentric pattern, but they are arranged along the septa with convex sides faced inwardly.

Geological age: — Middle Carboniferous?

This species has been regarded until present day to indicate the Upper Lower Carboniferous or Middle Carboniferous in age, but the new specimens were found in association with *Waagenophyllum,* the latter of which is a quite deformed specimen and in ill-preservation, although it is quite nearly related to *Waagenophyllum akasakensis* (YABE), the Permian species.

It is an open question, whether the former species is a derived fossil brought in the Permina limestone as a pebble or not, when the *Waagenophyllum* limestone was deposited.

Reg. nos.: — 12460, 12461, Hokkaido Univ., Department of Geology and Mineralogy.

Clisaxophyllum awa MINATO,
subsp. *atetsuense* nov.

Pl. 3, Figs. 3, 4.

Corallum simple, corallite ceratoid, slightly curved? fairly large in size. The septal number, calicular diameter and the diameter of the columella of each stage through the ontogeny of one specimen are tabulated below:

Septal number		calicular diameter	diameter of columella
31	31	15.0 mm	3.5 mm
36	36	16.0	3.5
38	38	18.0	5.0
40	40	22.0	6.5
43	43	26.0	9.5
45	45	28.0	10.0

Thus, the major septa increase in number as the corallite grows, and become as many as 45, which are observed to be always alternating with the same number of minor septa. Dissepimentarium very narrow or almost lacking in the early stage, while it becomes much wider in the mature stage.

The columella is not solid in the neanic stage. In cross section, it is observed to be composed of the primordial columella or median plate-like structure as well as septal lamellae- and axial tabellae-like structures, all of which show quite fibrous tissues.

Also very fine vesiculate structure are developed in this stage around the primordial columella, and in the outermost part of the columella. The feature is closely allied to the vesiculate columella observed in the corallites of *Clisaxophyllum awa* MINATO.

Next, the septal lamellae-like structures become less distinct, and coarsely arranged vesicles develop well on both sides of the median plate ; in the mature stage, the columella come to consist of highly convex vesicles arranged concentrically, with their convex sides faced outwards.

The feature is much like the columella of *Clisaxophyllum awa* MINATO in the transverse section, as above stated, although there are observable very fine and short trabeculae-like ridges radially arranged in the columella of the present species now in concern.

The septa, either major or minor ones, are very thick near the outer wall. They gradually become thin distally in early stage. However, the major septa show somewhat rhopaloid in the mature stage, while such feature is never observable in the minor septa even in the mature stage.

Cardinal septum is slightly shorter than the other major septa; it is not uniting with the median plate of the columella. Also the median plate is not connected with the counter septum at any time in the ontogeny of the corallite, so far as observed.

Dissepiments numerous, slightly angular or sub-angulo-concentric in arrangement. Wall rather thick.

In the longitudinal section the dissepimentarium is very wide in the mature stage where numerous dissepimental vesicles are arranged in more than 10 rows., with their convex sides faced inward near the tabularium, and upward as well as inward near the outer wall. The vesicles are variable in size, according to their situation; near the outer wall they are very large in general, while they are smaller and subequal in size near the tabularium.

Septa with septal gratings are also clearly discernible in the longitudinal section like the case of the cross section.

Columella in the mature stage consists of very sinuous median plate and quite numerous small vesiculate tabellae which are ascending towards the median plate, their convex sides being faced outwards as well as upwards. Most of these structures are strengthened by organic deposits.

Also there are observable numerous short ridges which are sporadically arranged in the columella, to diverge from the median plate. Their structures are observed in cross section as if trabeculae-like structures.

Tabulae not complete, rather sporadically arranged, counted 7 in a space of 5 mm, which are horizontal or gently inclined outwards.

Remarks:—It is almost beyond doubt that the present form is most like *Clisaxophyllum awa* MINATO, but the former is distinguishable from the latter in having trabeculae-like ridges in the columella, besides septal gratings.

In the holotype of *Clisaxophyllum awa* MINATO, it is now ascertained by recent re-examination that such trabeculae-like ridges in the columella are also developed, although they are never so prominent as in the present form. However there is no sign of the presence of such definite septal gratings in *Clisaxophyllum awa* MINATO.

Geological range:—Middle Carboniferous.

Reg. nos.:—12452—12459, Department of Geology and Mineralogy, Hokkaido Univ.

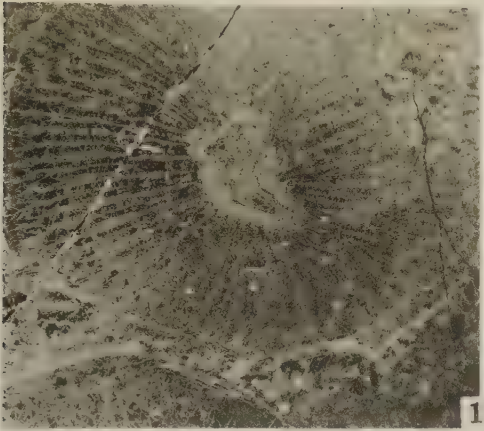
Reference

M. MINATO: Japanese Carboniferous and Permian corals. *Jour. Fac. Sci., Hokkaido Univ., ser. 4, Vol. IX, No. 2,* 1956.

Explanation of Plate 3

Figs. 1, 1a, 2. *Amygdalophyllum giganteum* (YABE et HAYASAKA) 1: (Cross section of corallite, ×3.0) Reg. no. 12461, 2: (Cross section of columella, ×5.0) Reg. no. 12461, 3: (Longitudinal section of corallite, ×3.0) Reg. no. 12462, Loc.: Niiyabara, Tsuchihashi, Niimi City.

Figs. 3, 4. *Clisaxophyllum awa* MINATO var. *atetsuense* var. nov. 3: (Longitudinal section of corallite, ×3.0) Reg. no. 12453, 4: (Cross section of corallite, x 5.0) Reg. no. 12454, Loc.: Morikuni, Niimi City.



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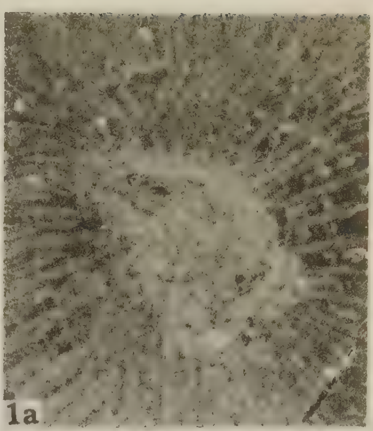

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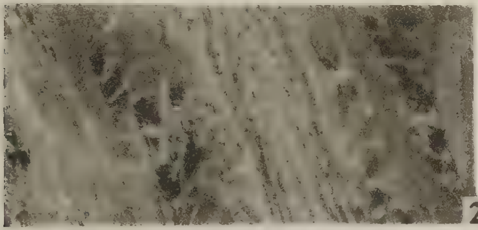

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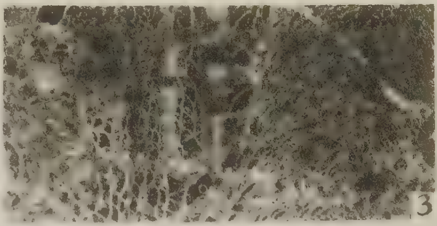

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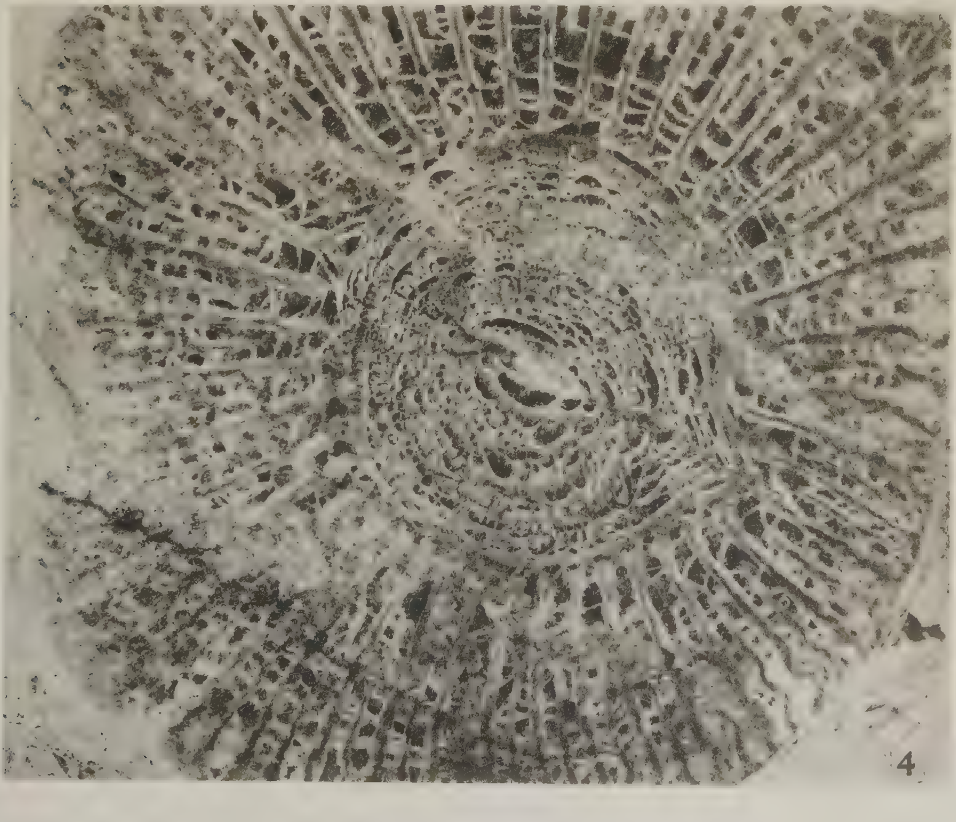

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M. Minato photo.

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 25, pp. 21—25, Pl. 4, April 30, 1957

309. SOME MOLLUSCAN FOSSILS FROM THE EASTERN PART OF THE TANZAWA MOUNTAINLAND*

MATSUTARO SHIBATA

Kyobashi Upper Secondary Chemical School

丹沢山塊東部の化石：丹沢山塊に分布する煤（すす）ケ谷（や）亜層群から産出する化石については，すでに二・三の報告がある。筆者は，本亜層群から産出する化石について検討した結果，あらたに3新種をみとめたので記載した。なお，本亜層群の化石は，暖流系・岩礁性で特徴ずけられている。また，本亜層群の基底から *Lepidocyclina nipponica* HANZAWA が発見された。これらの資料をもとにして，本亜層群の地質時代，および対比についても言及した。 柴田松太郎

Introduction

Reports in which the fossil mollusca from the so-called Misaka series in the eastern part of the Tanzawa mountainland have been listed but neither described nor illustrated are those by MITSUCHI (1932), WATANABE, MIKAMI, ÔNO and SHINOKI (1952), and SHINOKI and MIKAMI (1954). The discovery of *Lepidocyclina nipponica* HANZAWA by MIKAMI (1955) is noteworthy. The paleontological evidence of the mentioned authors seem to be insufficient for determination of the geological age and correlation, because their lists are not supplemented diagnostically.

The writer was fortunate in collecting several characteristic fossils from the Ochiai formation. The following species were discriminated, namely; *Haliotis (Euhaliotis) koikei* SHIBATA, n. sp., *Tegula (Chlorostoma) narusei* SHIBATA, n. sp., *Tegula* sp. indet., *Turbo (Batillus) cornutus* SOLANDER, *Astraea (Pachypoma) omorii* SHIBATA, n. sp., *Mytilus* cfr. *grayanus* DUNKER, *Ostrea (Crassostrea) gigas* THUNBERG, and *Venericardia panda* (YOKOYAMA); from the Jike formation were found *? Gibbula* sp. indet., *Coptothyris grayi* (DAVIDSON) and Echinoidea gen. sp. indet.; and from the Fudôjiri formation, only *Lepidocyclina nipponica* HANZAWA and Gastropoda gen. sp. indet. were discovered.

Acknowledgements

For suggestions and help in many ways the writer wishes to thank the following gentlemen. Profs. Haruyoshi FUJIMOTO and Kotora HATAI of the Institute of Geology and Mineralogy, Tokyo University of Education. Messrs. Masae ÔMORI, Saburô KANNO, Katsumi HIRAYAMA, Shigeru AOKI and Hiroshi UJIIE of the same Institute, Messrs. Kiyoshi KOIKE, Yô NARUSE and Tokihiko MATSUDA of the Geological Institute, University of Tokyo, Mr. Hisashi ISHIWARA, teacher of the Second High School of Hosei University.

Stratigraphic Sequence

The geological successions are as

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* Read Jan 21, 1956; received June 4, 1956.

Tanzawa group	Aikawa sub-group		
	fault		
	Susugaya sub-group	Ochiai formation (350 m)	mainly composed of conglomerate, fossiliferous.
		Jike formation (390 m)	mainly composed of an alternation of sandstone and mudstone, fossiliferous.
		Yatarô formation (535 m)	mainly composed of an alternation of sandstone and fine tuff.
		Ôsawa formation (800 m)	mainly composed of an alternation of tuff (perhaps iron saponite tuff) and hard shale.
		Fudôjiri formation (938 m)	mainly composed of an alternation of sandy shale and lappili tuff, fossiliferous.
	Ôyama sub-group		

follows:

The stratigraphy of the northeastern and eastern part of the Tanzawa Mountainland will be reported in detail by Ishiwara in a later paper.

Fossil localities

The fossil localities of the Ochiai formation are along the Hayato-gawa near Ochiai, Miyagase-mura, Aikô-gun, Kanagawa Prefecture. Those of the Jike formation are around Hayato, Toya-mura, Tsukui-gun, in the same Prefecture, and the localities of the Fudôjiri formation are near the dam of the Ochiai electric power station, Toya-mura, Tsukui-gun, also in Kanagawa Prefecture.

Geological age and correlation

The fossil fauna from the Susugaya sub-group, as a whole, comprises warm water inhabitants largely composed of those of rocky shores. *Lepidocyclina* occurs throughout the Susugaya sub-group. From thermal conditions and the occurrence of *Lepidocyclina*, the present group has characteristics common to those of Tertiary of Chichibu, particularly with the Chichibu-machi group. Therefore, the writer believes that the Susugaya sub-group may safely be correlated to the Chichibu-machi group.

It may be added that the discovery of *Lepidocyclina* from the base of the Fudôjiri formation is evidence sufficient for stating that the Susugaya subgroup is not older than the lower Miocene.

Systematic Description

Genus *Haliotis* Linné, 1758

Haliotis (*Euhaliotis*) *koikei* Shibata, n. sp.

Pl. 4, figs. 3a, 3b.

Shell large, rounded oval in outline, moderately convex, distance of maximum height from margin about equal to one-third of greatest length, surface sculptured by subequal cords with subequidistant interspaces and broad oblique wavy wrinkles; distance of apex from margin equal to about one-seventh of greatest length; perforations on dorsal border, the last four holes abruptly but roundly elevated, the shape of the holes ellipsoid, other holes rounded in shape and nodulously elevated.

Dimensions:-Reg. No. 5280* (Holotype) Maximum length 108 mm., minimum length 85 mm. (ca.), convexity 45 mm. (ca.).

Locality and formation:-Road-side along the Hayato-gawa near Ochiai, Miyagase-mura, Aikô-gun, Kanagawa Prefecture. Ochiai formation.

Comparisons and affinities:-The present species closely resembles *Haliotis naevosa* MARTYN and *Haliotis gigantea* CHEMNITZ. But it differs from the former by having less rolling of perforations, and from the latter by the following points, that is, 1) more rolled perforations, 2) lower elevation of every hole, last four holes ellipsoid in shape, 3) highest point leans towards apex, 4) spiral cords subequal, interspaces subequidistant.

Remarks:-The specific name is dedicated to Mr. Kiyoshi KOIKE who gave me some instruction. Although the occurrences of fossil *Haliotis* are very rare, the following reports are known:-

KOCHIBE (1882) briefly described and figured *Haliotis gigantea* CHEMNITZ from the Taga Miocene; YOKOYAMA (1925) illustrated *Haliotis gigantea* var. *kamtschatkana* JONAS (=*Haliotis kamtschatkana koyamai* MAKIYAMA) from the Shigarami Pliocene; MAKIYAMA (1927) described *Haliotis kamtschatkana koyamai* n. subsp. from the Shigarami Pliocene; KURODA (1931) listed *Haliotis kamtschatkana koyamai* MAKIYAMA from the Shigarami Pliocene; NOMURA and NIINO (1932) described *Haliotis kamtschatkana glabrosa* n. subsp. from the Yugashima Miocene; NOMURA (1940) described *Haliotis* (*Sanhaliotis*) *japonica* REEVE from the Moniwa Miocene; WATANABE, ARAI and HAYASHI (1950) reported *Haliotis* (*Sanhaliotis*) n. sp. from the Haraya Miocene; WATANABE, MIKAMI and SUZUKI (1952) listed *Haliotis kamtschatkana glabrosa* NOMURA and NIINO from the Itami Pliocene; and, HANZAWA, HATAI, IWAI, KITAMURA and SHIBATA (1953) listed *Haliotis japonica* REEVE from the Moniwa Pliocene.

Genus *Tegula* LESSON, 1832

Tegula (*Chlorostoma*) *narusei* SHIBATA, n. sp.

Pl. 4, figs. 1a, 1b, 1c.

Shell trochoid, more or less deformed, whorls four in number, protoconch missing; upper two whorls smooth, longitudinal plicae developed on the surface of the penultimate whorl, but reduced to mere oblique axial threads on the last whorl; upper two whorls somewhat compressed and the lower two whorls steep; aperture depressed, rounded trigonal in outline, outer lip sharp, peripheral margin rounded; one strong tooth on the inner lip; sub-umbilicated.

Dimensions:-Reg. No. 5277 (Holotype) Height 35 mm., diam. 35 mm.

Locality and formation:-Along the Hayato-gawa near Ochiai, Miyagase-mura, Aikô-gun, Kanagawa Prefecture. Ochiai formation.

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* All of the specimens are preserved in the collection of the Institute of Geology and Mineralogy, Tokyo University of Education.

Comparisons and affinities :-The present species is allied to *Tegula* n. sp. 2 reported by WATANABE, ARAI and HAYASHI from the Tertiary deposits of the Chichibu Basin, but it differs by the absence of longitudinal plicae on the last whorl.

Remarks :-The specific name is dedicated to Mr. Yô NARUSE, who gave me various instruction.

Genus *Astraea* (" BOLTEN ") RÖDING, 1798

Astraea (*Pachypoma*) *omorii* SHIBATA, n. sp.

Pl. 4, figs. 2a, 2b, 2c.

Shell trochoid, depressed, large, conic-pyramidal, solid, thick, broader than high; surface of whorls flat, declined, sculptured by oblique axial plicae, the plicae weaker on the upper but stronger on the lower where they become somewhat crossed; peripheral margin angulated; on the lower surface sculptured by nine spiral cords, with alternating weak knotted and smooth cords; the columella base somewhat elevated, umbilical area somewhat concave; aperture squarely rounded in outline, outer lip sharply inclined, basal lip thin; columella somewhat concave, smooth, tooth-like swelling on lower part.

Dimensions:—Reg. No. 5276 (Holotype) Height 61 mm. (ca.), diam. 65 mm.

Locality and formation :—Same as above.

Comparisons and affinities :— The present species resembles *Astraea* (*Pachypoma*) *inaequalis montereyensis* OLDROYD, but it differs by the following points, that is, 1) being broader than high, 2) larger apical angle, 3) nine spiral cords on the base, 4) squarely rounded aperture, 5) peripheral margin not carinated.

Remarks :-The specific name is dedicated to Mr. Masae ÔMORI who helped the writer in his study.

The first record of this subgenus *Pachypoma* as fossil in Japan is by OZAKI (1954) who described an interesting species from the basal conglomerate of the Pliocene deposits in Tyosi City. The present record is the second one in Japan.

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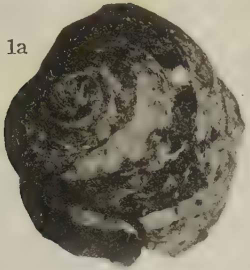
Explanation of Plate 4

Figs. 1a–c. *Tegula* (*Chlorostoma*) *narusei* SHIBATA, n. sp. Holotype, Reg. No. 5278. a. Apical view × 1, b. Apertural view × 0.85, c. Umbilical view × 1
Loc. Along the Hayato-gawa near Ochiai, Miyagase-mura, Aikô-gun, Kanagawa Prefecutre.

Figs. 2a-c. *Astraea* (*Pachypoma*) *omorii* SHIBATA, n. sp. Holotype, Reg. No. 5276. a. Apical view × 0.89, b. Apertural view × 0.89, c. Umbilical view × 0.92.
Loc. ditto.

Figs. 3a, b. *Haliotis* (*Euhaliotis*) *koikei* SHIBATA, n. sp. Holotype, Reg. No. 5280. a. Apical view × 0.81, b. Dorsal view × 0.81.
Loc. Road-side along the Hayato-gawa near Ochiai, Miyagasemura, Aikô-gun, Kanagawa Prefecture.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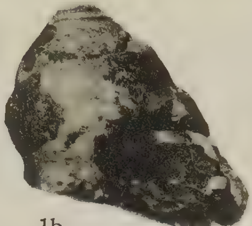
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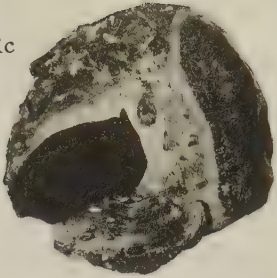
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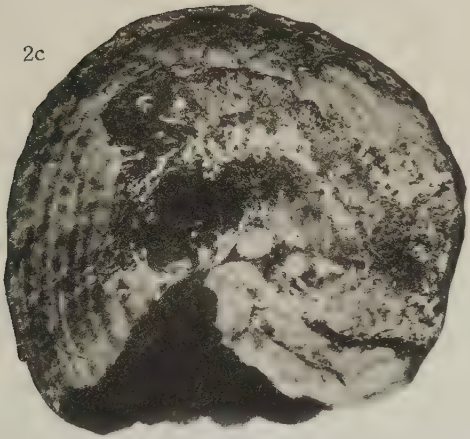
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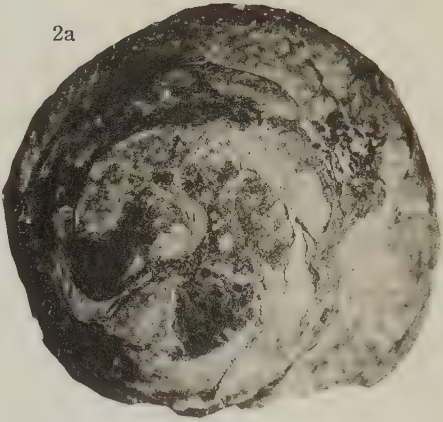
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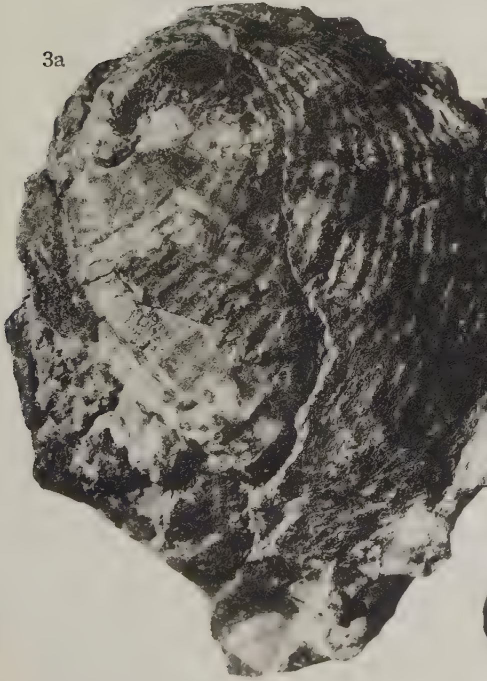
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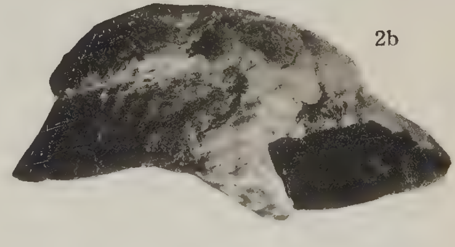
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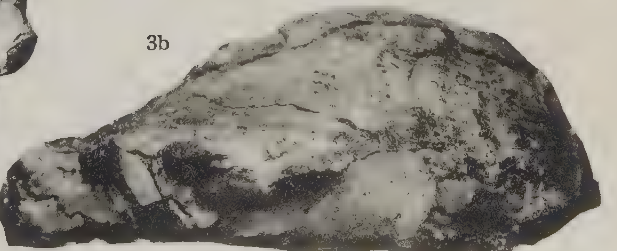
3b

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310. A MIOCENE FOSSIL CRAB, *PARATYMOLUS YABEI* N. SP. FROM NAGANO PREFECTURE *

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長野県下伊那郡千代村米川，千代小学校北側崖の中新世米川層より産出した *Paratymolus yabei* n. sp. を記載し，その集団型の産状が生態的であることを報じた。現生の *P. pubescens* は *P. yabei* に近似し，*P. yabei* から進化したものと考えられ，形態の異る現生種 *P. sexspinosus* は動揺期に分岐した系統と考えられる。本標本には複眼の構造も保存されている部分がある。和名チヨガニ。

今泉力蔵

Introduction :—Emeritus Professor Hisakatsu Yabe kindly brought the fossil crabs from Chiyo-mura, Shimoina-gun, Nagano Prefecture to the writer for his study. The fossil crabs were collected by a school boy of the Chiyo Primary School on April 12, 1949 and later they were passed to the hand of Mr. Yoshikatsu Shimaoka of the Yokohama National University, who was in the course of the stratigraphic field work around Chiyo-mura. These fossil crabs were studied by Dr. Tune Sakai and Dr. Tokio Shikama of the Yokohama National University who determined them as a new genus and a new species, "*Tiyocarcinus bifidus*", though their detailed description was not given.

The writer visited the locality of the fossil crabs, in spring of 1956, observed the occurrence, and collected other species of fossil crabs. The fossil crabs are well preserved, showing their fine structures, and belong to the *Paratymolus*, which has hitherto never been reported as a fossil.

Acknowledgements :—The writer is deeply indebted to Emeritus Professor Hisakatsu Yabe who gave the specimen to the writer and has constantly guided the writer's study. Thanks are due to Dr. Tokio Shikama and Dr. Tune Sakai who advised the writer for the further study. The writer wishes to express his thanks to Professors Shôshirô Hanzawa, Kiyoshi Asano, Kotora Hatai and Kenzo Yagi Tohoku University, for their continuous encouragements.

Family Majidae Alcock

Subfamily Inachinae Alcock

Genus *Paratymolus* Miers, 1879

Miers, J. Edward. 1879, On a Collection of Crustacea made by Capt. H. C. St. John, R. N., in the Corean and Japanese Seas, *Proc. Zool. Soc. London*, pp. 21, 45, and 46, Pl. II, Fig. 6.

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* Read June 16, 1956; received July 9, 1956.

Paratymolus yabei, n. sp.

Pl. 5, Figs. 2—8, Text-fig. 1

Carapace elongate pentagonal and postero-lateral borders of the carapace longer than the antero-laterals. The ratio of length to width is 5 : 4. Surface uneven and regions indistinct. Rostrum large and acutely bilobated. The eye-stalk is exposed. Two strong spines at the antero-lateral border, one on the anterior angle of the hepatic region is larger and another smaller one behind of it is acute and directing forward. The postero-lateral parts of the carapace are not completely preserved. Protogastric region and the anterior part of the meso-gastric region are covered with granules. The granules on the former region are round and larger than those on the latter. Epi-branchial and meso-branchial region are also covered with small granules. Granules on the postero-branchial region are obliquely oblong, and under magnification, these oblong granules have two or three small granules on the crests.

Antero-lateral, lateral, posterior part of the postero-lateral and posterior border are rimmed with granules. Antenna seems to be long. Thoracic sternum is relatively narrow. Chelipeds are moderate in size, fingers are longer than manus, movable finger with three or four blunt teeth, narrower than immovable finger, and has a longitudinal row of granules on its outer-upper part. Carpus of the cheliped has a spine on its inner distal angle. Pereiopods long and slender, merus long and broad, with a longitudinal groove on its postero-outer part; carpus short, propodus broad at its distal half, shorter than dactylus; dactylus narrow. The first and fourth pereiopods are longer than the second and the third. Minor structure of the compound eye is well preserved, and square facets are about 20 μ in diameter.

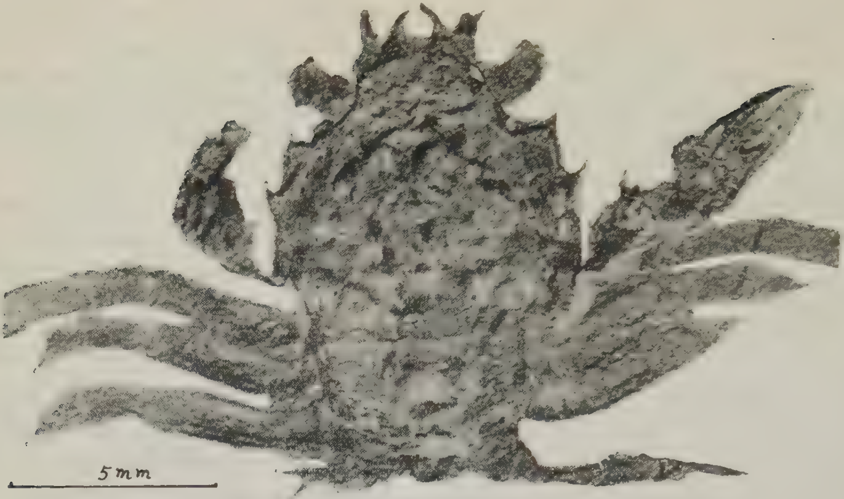
Dimensions (in mm):—Length of carapace, 8–9; with of carapace, 6–7; length of cheliped, 4; length of appendage, 10–13.

Locality and geological horizon:—North cliff in the ground of the Chiyo Primary School, Yonekawa, Chiyo-mura, Shimoina-gun, Nagano Prefecture, IGPS loc. no. N-5, lat. 35° 25′ 2″ N., long. 137° 51′ 58″. 6 E., middle part of Yonekawa formation, Tomikusa group Miocene.

Repository:—IGPS coll. cat. no. 79485.

Occurrence and preservation:—There are about twenty specimens in the slab which is 65 mm × 195 mm in size. The lithology of the slab bearing the fossil crab, is dark brownish gray fine siltstone. Laminations are indistinct and perhaps very thin, about 2 mm. thick. Between the natural parting, the rock is massive and has concoidal fracture. Most of the specimens are the impressions of the carapaces and some of them have been doubly pressed by its theracic sternums with the abdominal somites on the impression of the carapaces. The fossils occur within so uniform and homogeneous matrix that the minor structure such as the compound eye is well preserved, and the carapaces have retained some of its original relief. Some specimens show the sternums with the abdomens of male, which are replaced by the carbonate material. Depression of the sediment has produced considerable spreading and distortion. Some of the specimens compressed obliquely and the sternums with the abdominal somites are displaced from the impressions of the carapaces, but the directions of the displacements are not constant.

The impressions of carapaces are separated from their sternums and



Text-figure 1—*Paratymolus yabei*, n. sp., showing dorsal view, the same specimen as figured in pl 5, Fig. 4.

abdominal parts, and therefore the specimens bearing ventral parts must have their impressions of carapaces under the ventral surfaces. Regardless of whether the specimens show their dorsal views or their ventral views, the fossil crabs on the handspecimen always lay their outer surfaces of carapaces down on the surface of the slab. It is concluded from this fact that these fossil crabs had been living on some plane of sediments, and were embedded later without an upside down arrangement. Almost all the specimens have their appendages. These facts suggest that they were rapidly embedded in the sediments after death without agitation.

The field observations show that the horizon of the fossil crabs, *Paratymolus yabei* is restricted to two or three metres in thickness, probably, in the middle part of the Yonekawa formation. The fragments of the appendages of the fossil crabs, *Paratymolus yabei* occur from two or three thickness of siltstone but such well preserved specimens as in this slab are limited to some parts of the thin laminae. These specimens of fossil crabs are the same in size or have attained the same stage of growth. These grouped assemblage of the fossil crabs is thought to be resulted from their ecological condition.

At the north cliff in the ground of the Chiyo Primary School (Fig. 1), a white siltstone is exposed lying conformably on this dark brownish gray siltstone bearing *Paratymolus yabei*. Another species of the fossil crabs rarely occur here with accompanied with the abundant mollusc remains, such as *Solemya tokunagai* Y., and *Yoldia* (*Yoldia*) *laudabilis* YOK., *Linthia nipponica* YOSHIWARA, and plant impressions such as *Acer*, *Quercus*, and algae.

Callianassa sp. aff. *inornata* NAGAO and HUZIOKA was reported from the Arakida formation, which is correlated to the Yonekawa formation, at Idozawa, Furujyo, Tomikusa-mura, Shimoina-gun,*1 (SHIKAMA, 1954, p. 87, Pl. VII, Fig. 6, List 16). The carpus of this specimen is shorter than the manus, but *Callianassa inornata* has the carpus of the cheliped that is longer than the manus. This specimen is nearer to *Callianassa titaensis* NAGAO than to *Callianassa inornata*, and the specimen perhaps may belong to a new species different from these species. *Tymolus* sp. also was reported from the Awano formation, which conformably overlies the Arakida formation, at Shonosawa, Mombara, Tomikusa-mura, (SHIKAMA, 1954, Pl. VIII, Fig. 7, List 16).[*2] This specimen seems to belong to *Tymolus kamadai* IMAIZUMI, collected from the Miocene Numanouchi formation, at east cliff of Kosuganotsutsumi, Takaku-mura, Iwaki-gun, Fukushima Prefecture and Misaki, Ena-machi, Iwaki-gun.[*3]

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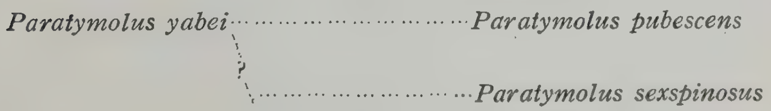
*1 下伊那郡富草村古城井戸沢　新木田層

Remarks:—From Japan, two Recent species of the *Paratymolus* have been known, *Paratymolus pubescens* MIERS, 1879 and *Paratymolus sexspinosus* MIERS, 1884. The former is known from various parts of the sea bottom, 10 to 100 metres deep, south of the Tokyo Bay, Sagami Bay, Izu Peninsula of Shizuoka Prefecture, Mie Prefecture; Kagoshima, Nagasaki, coast of Kyushu and to Thursday Island, northern extremity of Queensland, and the Gulf of Siam, and the latter from rocky or weedy ground, not far from the shore line, Shimoda of Shizuoka Prefecture, India and Australia.

The rostrum of *Paratymolus pubescens* is larger than that of *Paratymolus sexspinosus*, which is indistinctly bilobated, but is smaller than one of *Paratymolus yabei*. The eyestalks of *Paratymolus pubescens* is longer and slender than those of *Paratymolus sexspinosus*, and those of *Paratymolus yabei* are long and stout.

The anterior hepatic spine of *Paratymolus pubescens* is smaller than the posterior one, which is large and acute, but in *Paratymolus yabei*, the anterior one is larger and broad at its base and the posterior one acute and directing more forward than the one of *Paratymolus pubescens.*

In *Paratymolus sexspinosus*, there are two projections on the hepatic region and the anterior projection is larger than the posterior one. In the general outline of the carapace, which is more important feature than the eyestalk or the sizes of lateral spines, *Paratymolus yabei* is nearer to *Paratymolus pubescens* which is far longer than width and of which one specimen is 7.5 mm in length and 6 mm in width. *Paratymolus sexspinosus* is slightly longer than wide, of which one specimen is 10 mm in length and 9.5 mm in width. The anterior width of the carapace of *Paratymolus pubescens* is almost the same as the width of the postero-lateral part but the anterior one of *Paratymolus sexspinosus* is wider than the postero-lateral part of the carapace. In these features, *Paratymolus yabei* is more nearer to *Paratymolus pubescens* than to *Paratymolus sexspinosus*. These relations of the features suggest, hypothetically the following phylogeny about these three species.



[*2] 下伊那郡富草村古城門原庄ノ沢粟野層

[*3] 福島県石城郡高久村小萱堤東岸及び江名町三崎沼之内砂岩層

Paratymolus pubescens has more close relations of the phylogeny to *Paratymolus yabei* than to *Paratymolus sexspinosus*, and the latter is the one that has not evolved from *Paratymolus pubescens* but branched from *Paratymolus yabei*, as the time of tremble, as *Paratymolus pubescens* evoluted from *Paratymolus yabei*.

The eyestalk of crab is related to the hormone gland controlling the ecdysis and comparatively important organ. One can see the orthogenetic change of the eyestalk among these three species, that is, in *Paratymolus yabei* the eyestalk is large, in *Paratymolus pubescens* eyestalk is slender and in *Paratymolus sexspinosus* it is small. There is no such relation as above described in the subordinate feature as the lateral spines. Square facets of the compound eye of *Paratymolus yabei* are about 20 μ in diameter and smaller than the facets of the compound eye of *Astacus spinirostrius*, which the writer has reported 1938 from the *Lycoptera davidi* formation, Upper Jurassic or Lower Cretaceous, at Nieshutsekow, near Lingyuan, Jehol, (IMAIZUMI, 1938, Pl. XXIII, Fig. 10); the diameters of the square facets are about 50 μ.

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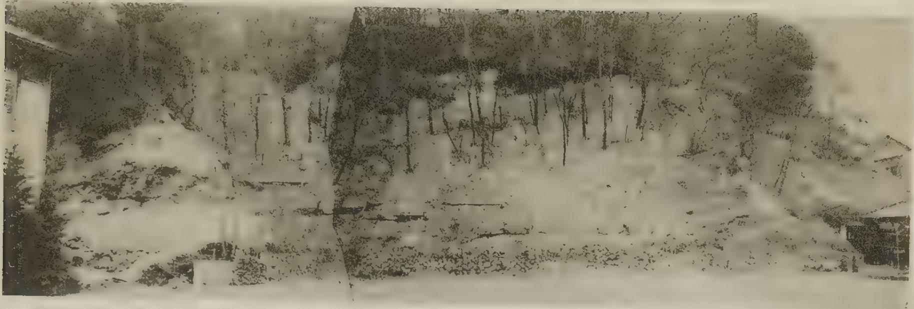
Explanation of Plate 5

Figure 1. North cliff of the ground of Chiyo Primary School, Yonekawa, Chiyo-mura, Nagano Prefecture.

Figures 2-8. *Paratymolus yabei*, n. sp.

2. Slab bearing specimens, nat. size.
3. Well preserved specimen showing dorsal view, in the left of the slab, ×3.
4. Impressions of carapaces, showing dorsal views, specimens in a part, a little to the center of the slab, ×8/3.
5. A specimen showing ventral view in the right of the slab, ×3.
6. A specimen showing ventral view in the right of the slab, ×8/3.
7. Fragments of a cheliped and an anterior part of carapace with eyestalks, in the right lower border of the slab, ×2.
8. Square facets of compound eye of the same specimen as figured in fig. 7, ×18.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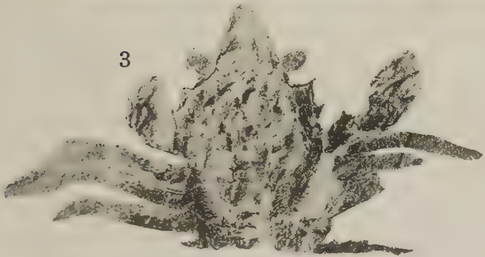
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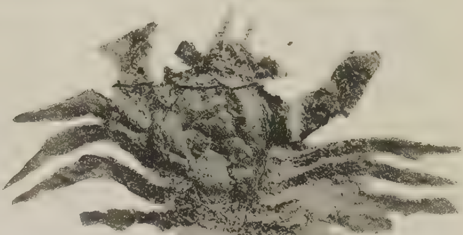
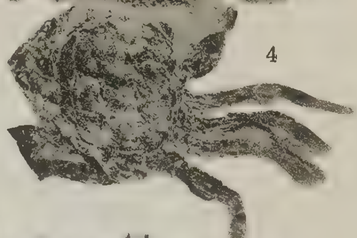
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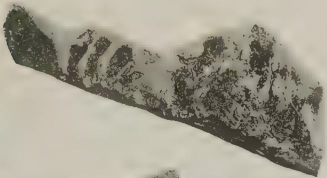
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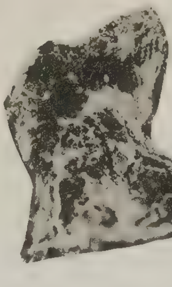
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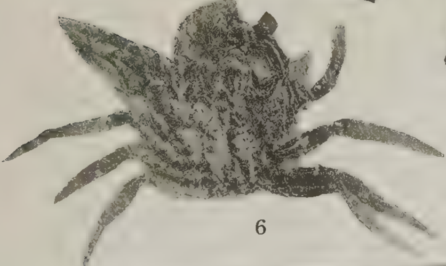
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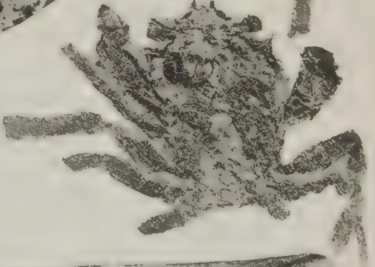
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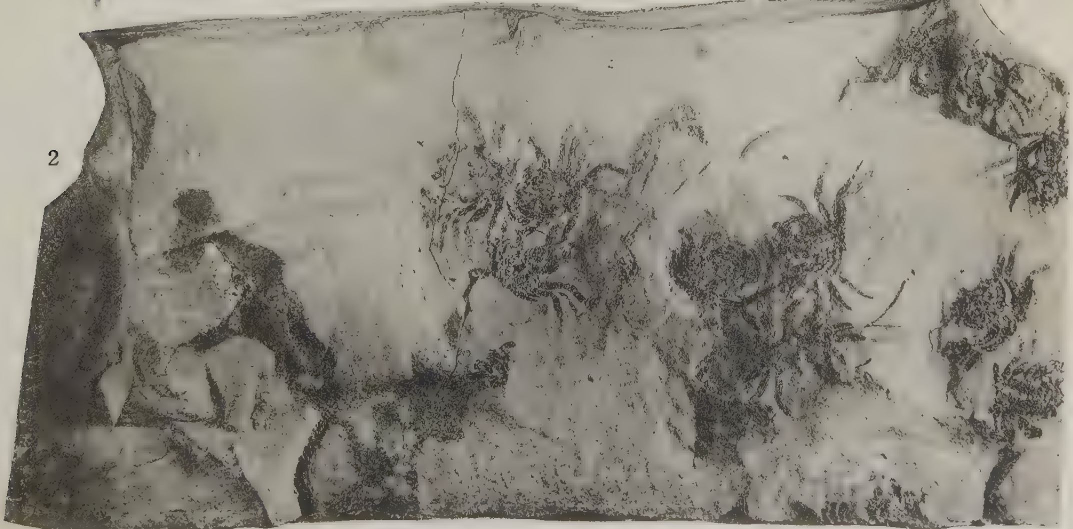
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Trans. Proc. Palaeont. Soc. Japan, N.S., No. 25, pp. 31—39, Pls. 6-7, 2 text-figs., Apr. 30, 1957

311. *AMUSSIOPECTAN IITOMIENSIS* (OTUKA) AND ITS ALLIES FROM JAPAN*

MASAHIKO AKIYAMA

Geological and Mineralogical Institute, Tokyo University of Education

Amussiopecten iitomiensis (Otuka) とその近縁種について： 大塚弥之助が静川砂岩から *Pecten iitomiensis* Otuka として記載した化石種は *Amussiopecten* 属に属し，*Amussiopecten hyugaensis* Shuto は本種と同一種であることを指摘し，その再記載を行つた。また，本属の他の 3 種を再検討し，それらの相異点を明らかにした。 秋 山 雅 彦

The genus *Amussiopecten* has been reported from many localities of Japan and Formosa (Text-fig. 1).

Amussiopecten praesignis (Yokoyama) was first described by M. Yokoyama in 1922 from an unknown locality. In 1926 he pointed out "that its locality lies somewhere in Southern Totomi", Shizuoka Prefecture. This species is also recorded by the same author from the Lower Byoritsu beds in Taiwan (1928) and Tonohama in Tosa (1929). As was pointed out by T. Kuroda (1931), the specimen recorded from the former locality should be referred to another species. In 1932 S. Nomura and H. Niino reported the present species from the Nawachi gold mine, Izu Peninsula, but this specimen also represents another species. S. Nomura and N. Zinbo recorded this species from the Shimaziri beds, Okinawa in 1936. Y. Otuka also reported the present species from the Tanna tunnel, Shizuoka Prefecture (1933), northern foot of Mt. Minobu, Yamanashi Prefecture (1934), and south of Murono, Shizuoka Prefecture (1938), but the specimens from the second locality should be referred to another species.

Amussiopecten planicostulatum (Nomura and Niino) was first described by S. Nomura and H. Niino in 1932 from the Shirahama group at Ichiya near Yugashima, Izu Peninsula, but no subsequent record of occurrence has been published.

Amussiopecten yabei (Nomura) was first described by S. Nomura in 1933 from Taiwan.

Recently, T. Shuto (1955) described *Amussiopecten hyugaensis* Shuto and *Amussiopecten praesignis* (Yokoyama) from Hyuga, Miyazaki Prefecture, and discussed their stratigraphic significance.

The writer studies some specimens of *Amussiopecten praesignis* which are probably topotypes, many individuals of "*A. praesignis*" and some of "*Pecten iitomiensis* Otuka" from the southern foot of Mt. Minobu, Yamanashi Prefecture, and some of *A. planicostulatum* from Abuzuri, Zushi City, Kanagawa Prefecture.

As the result of his study, it becomes clear that the topotype specimens of "*Pecten iitomiensis* Otuka" represent *Amussiopecten iitomiensis* (Otuka),

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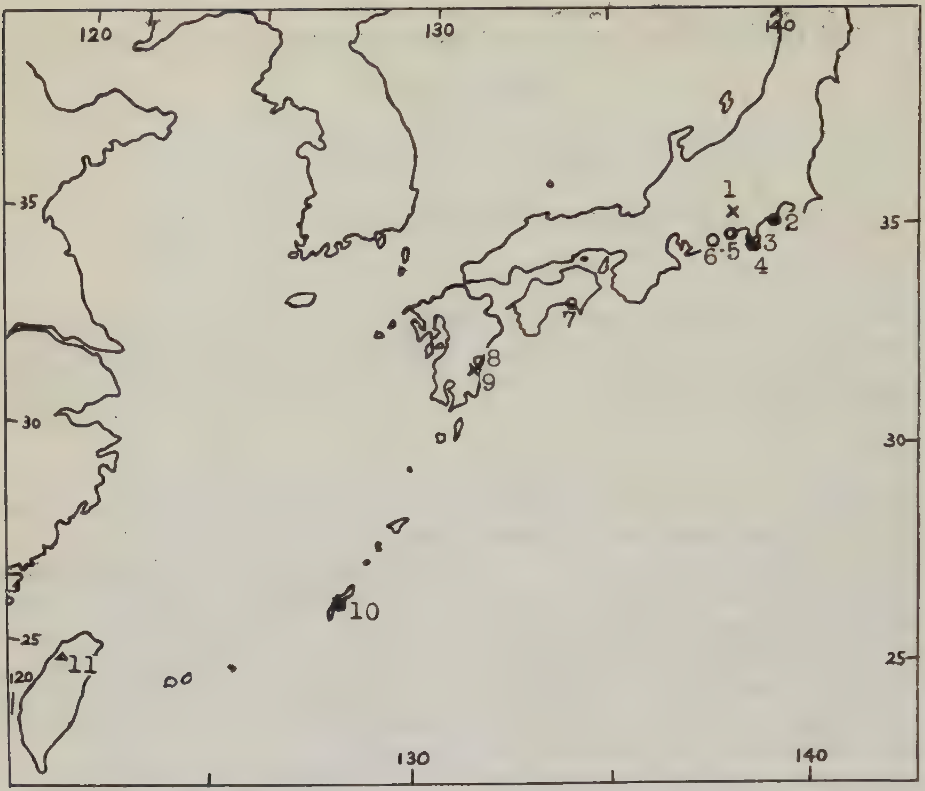
* Read June 20, 1956; received Sept. 8, 1956.



Text-figure 1. Map showing the distribution of the genus *Amussiopecten* in Japan and Formosa. ○: *A. praesignis* (Yokoyama). ×: *A. iitomiensis* (Otuka). ●: *A. planicostulatum* (Nomura and Niino). △: *A. yabei* (Nomura). 1. Shizukawa sandstone. 2. Zushi formation. 3. Yugashima group. 4. Shirahama group. 5. Hamaishidake conglomerate. 6. Dainichi sand. 7. Tonohama group. 8. Takanabe formation. 9. Miyazaki group. 10. Shimaziri beds.* 11. Byoritsu beds.

including the individuals from the northern foot of Mt. Minobu which Y. Otuka (1934, 1936) once assinged to *A. praesignis*, and that *Amussiopecten hyugaensis* Shuto is a synonym of this species.

In this paper the writer discusses the above mentioned four species and clarifies their variations and interspecific relationships.

Acknowledgements are due to Dr. Haruyoshi Fujimoto, Dr. Kotora Hatai and Mr. Masae Omori of the Geological and Mineralogical Institute, Tokyo University of Education, for their valuable suggestions and reading of this manuscript. Thanks are due to Mr. S. Akagi, Mr. T. Matsuzaki and Mr. T. Omori, for co-operating with him in collecting some of the present specimens.

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* It is questionable whether these specimens can be assigned to *Amussiopecten praesignis* (Yokoyama).

Family Pectinidae

Subfamily Amusiinae

Genus *Amussiopecten* Sacco, 1897

Amussiopecten praesignis (Yokoyama)

Pl. 7, Figs. 5, 6.

1922 *Pecten praesignis*, Yokoyama, *Jour. Geol. Soc. Tokyo, vol. 29, no. 530*, pp. 1–2, pl. 5, figs. 1–3.

1926 *Pecten praesignis*, Yokoyama, *Jour. Fac. Sci., Imp. Univ. Tokyo, Sec. 2, vol. 1, pt. 9*, pp. 357–358, pl. 40, figs. 1, 2; pl. 41, fig. 1.

1931 *Amussiopecten praesignis*, Kuroda, *Venus vol. 3, appendix*, pp. 76–77, fig. 80.

1938 *Amussiopecten praesignis*, Otuka, *Jour. Fac. Sci., Imp. Univ. Tokyo, Sec. 2, vol. 5, pt. 1*, pp. 6–7, pl. 1, fig. 2.

1955 *Amussiopecten praesignis*, Shuto, *Trans. Proc. Palaeont. Soc. Japan, N. S., no. 20*, pp. 103–104, pl. 17, figs. 1, 3.

The six specimens collected by the writer and his friends from the Dainichi sand, Shizuoka Prefecture take the following description.

Shell large, rather thin, longer than high, orbicular in outline; right valve more convex than the left; both valves radiately ribbed. Right valve equilateral, with 16–17 broad, elevated, flat-topped, straight ribs, which become gradually lower towards the ventral and the lateral margins, and sometimes bifurcate at the lateral borders and sometimes are single; interstices narrower than ribs themselves; internal ribs 13 pairs in number, wide and flat at the beginning but later becoming prominent and concave to have prominent ridges on both sides; interstices becoming as wide as the ribs at the ventral border. Growth line weak but distinct. Ears subequal; anterior ear being somewhat wavy and with weak but distinct byssal notch. Hinge line wing-like. Left valve almost flat, ornamented with external and internal ribs and growth lines; external ribs rounded and as wide as interstices.

The measurements are shown in Table 1 (in mm.).

Table 1

Reg. No.	L.	H.	D.	Hinge line	H/L	D/L	Hinge/L	No. of Ribs	Apical Angle	Valve
5391	104	102	14	46	.98	.13	.44	17	127	R.
5392	93	80	8	48	.86	.09	.52	16	127	R.
5393	114	108	7		.95	.07				R.
5394	66	64	10		.97	.15				R.
5395	84	73	8	36	.87	.10	.43	16	120	R.

Remarks:—This species is characterized by the rather thin, large shell which is provided with 16–17 elevated, flat-topped, bifurcating, radial ribs which have prominent ridges on both sides. The ribs become obsolete towards the ventral and the lateral margins and are broader than the interstices. The umbonal angle exceeds 120 degrees. It is noteworthy that the bifurcating ribs are hardly recognized in one specimen and the ratio of height to length of the shell varies between .86 and .98.

The specimen figured by M. Yokoyama (1928) from Lower Byoritsu beds should not be included in this species, as was suggested by T. Kuroda (1931). The specimens reported by Y. Otuka (1934) from the Shizukawa formation should be assigned to *A. iitomiensis* (Otuka), and the one recorded by S. Nomura and H. Niino from the Nawachi gold mine may be also included in *A. iitomiensis*.

Locality and horizon:—In the tunnel near Nishiyama, Haranoya-mura, Ogasa-gun, Shizuoka Prefecture; Dainichi sand.

Repository:—The Geological and Mineralogical Institute, Tokyo University of Education. Reg. No. 5390–5395.

*Distribution**: — 1) Hamaishidake conglomerate, Shizuoka Prefecture; 2) Tonohama group, Kochi Prefecture; 3) Takanabe member, Miyazaki Prefecture.

Amussiopecten planicostulatum
(Nomura and Niino)

Pl. 7, Figs. 2, 3, 4.

1932 ***Pecten planicostulatus*** Nomura and Niino, *Sci. Rep., Tohoku Imp. Univ., 2nd. Ser., vol. 15, no. 3*, p. 117, pl. 12, figs. 2, 3, 4, 5.

1952 ***Amussiopecten planicostulatum***, Hatai and Nishiyama, *Sci. Rep., Tohoku Imp. Univ., Spec. Vol., No. 3*, p. 116.

The original description of *Amussiopecten planicostulatum* (Nomura and Niino) is as follows.

"Shell large, about 110 mm. in height, compressed, length nearly equal to height, subequivalve, subequilateral; sides straight, with margins smooth; umbonal angle about 110 degrees. Test rather thin. Right valve ornamented by 18 low, rounded, subequal ribs which are sometimes dichotomous or branching; in some specimens the ribs are almost obsolete near the ventral margin; interspaces subequal, very shallow, much narrower than the ribs, rarely provided with interstitial riblets; whole surface covered by numerous fine growth lines and a few stronger periodic ones; hinge line less than one-half of disk-length. Ears subequal in length; anterior ear rounded in front and ornamented by almost obsolete radials as well as concentric lines of growth; byssal notch rather shallow and broad; posterior ear is obliquely truncated, ornamented by only concentric lines. Left valve quite similar to the right except for almost unequal ears." The four specimens of the right valve and a single one of the left which were collected by the writer from the Zushi formation at Abuzuri, Kanagawa Prefecture take the following description.

Shell large, rather thick, longer than high, orbicular in outline; almost equilateral and inequivalved; umbonal angle 110–120 degrees. Right valve with 15–18 broad, rounded, straight ribs, which become gradually obsolete towards the ventral and the lateral margins and are rarely provided with interstitial riblets; interstices much narrower than ribs themselves. Internal ribs with prominent ridges on both sides at the ventral side. The shell surface has fine distinct concentric lines near the ventral margin. Ears subequal and wing-like; anterior ear larger than posterior one. Byssal notch shallow but distinct. Imperfectly preserved left valve with low, rounded, radial ribs which are as wide as interstices and provided with interstitial riblets. Concentric lines are weak but distinct.

The measurements are shown in Table 2 (in mm.).

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* This species was reported from the Neogene of Tanna tunnel (Otuka 1933) and from the Shimaziri beds (Nomura and Zinbo 1936), but these specimens were not figured, so it is questionable whether they can be assigned to this species.

Table 2.

Reg. No.	L.	H.	D.	Hinge line	H/L	D/L	Hinge/L	No. of Ribs	Apical Angle	Valve
5397	104	90	7		.87	.07		18	110	R.
5398	94	92	11	46	.98	.11	.49	15	110	R.
5399*	91	87	9	48	.96	.10	.53	18	120	R.
5400	106	95	9	55	.90	.09	.52	17	120	R.

Remarks:—This species is characterized by the rather thick, large shell which is provided with 15–18 low, rounded, radial ribs and with interstitial riblets on the left valve. The ribs become obsolete towards the ventral and the lateral margins, and are much broader than the interstices. The umbonal angle is less than 120 degrees.

The type specimens have sometimes dichotomous ribs which are never recognized in the present specimens from the Zushi formation. The left valve (Nomura and Niino 1932, pl. 12, fig. 5) to which S. Nomura and H. Niino assigned their specimen may belong to the right valve.

Amussiopecten praesignis (Yokoyama) is closely allied to this species, but the former has more elevated, flat-topped, radial ribs, larger umbonal angle and broader interstices which are never provided with interstitial riblets.

Locality and horizon:—Abuzuri, Zushi City, Kanagawa Prefecture; Zushi formation.

Repository:—The Geological and Mineralogical Institute, Tokyo University of Education; Reg. No. 5396–5400.

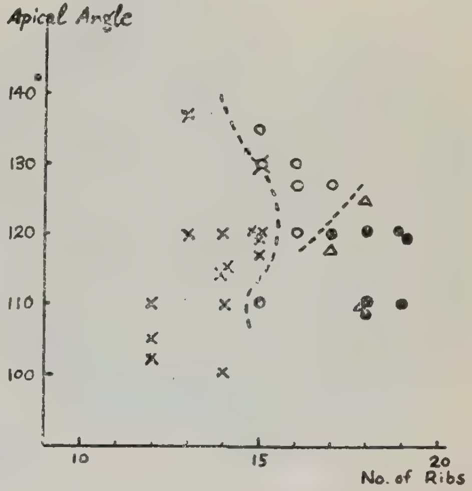
Distribution:—Shirahama group near Yugashima, Izu Peninsula.

Amussiopecten yabei (Nomura)

1928 *Pecten (Amusium) praesignis*, Yokoyama, *Imp. Geol. Surv. Japan, Rep. No. 101*, p. 96, pl. 15, fig. 1.

1933 *Pecten (? Amussiopecten) yabei* Nomura, *Sci. Rep., Tohoku Imp. Univ., 2nd Ser., Vol. 16, No. 1*, p. 59, pl. 2, figs. 3, 4.

The type specimens figured by S. Nomura are ill preserved. S. Nomura pointed out that it is distinguishable from *A. praesignis* by the numerous internal ribs, however it may be suggested from Text-figure 2 that his specimens should be included in *A. planicostulatum*.



Text-figure 2. Variation diagram of the apical angle to the number of ribs with regard to right valves of four species of *Amussiopecten*. ○: *Amussiopecten praesignis* (Yokoyama). ×: *A. iitomiensis* (Otuka). ●: *A. planicostulatum* (Nomura and Niino). △: *A. yabei* (Nomura).

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* This specimen was collected by teachers of natural science at the Meguro Fourth Middle School in Tokyo, to whom the writer expresses his sincere thanks for their gift of it.

Amussiopecten iitomiensis (Otuka)

Pl. 6, Figs. 1, 2, 3, 4, 5, 6; Pl. 7, Fig. 1.

1934 *Pecten iitomiensis* Otuka, *Jour. Geol. Soc. Tokyo, Vol. 41, No. 492,* pp. 566–567, text-fig. 1.

1934 *Amussiopecten praesigne,* Otuka, *ibid.,* p. 567.

1936 *Amussiopecten praesignis,* Otuka, *Geogr. Rev., Vol. 14, No. 12,* p. 978.

1952 *Patinopecten iitomiensis,* Hatai and Nisiyama, *Sci. Rep., Tohoku Imp. Univ., 2nd Ser., Spec. Vol., No. 3,* p. 110.

1955 *Amussiopecten hyugaensis,* Shuto, *Trans. Proc. Palaeont. Soc. Japan, N. S., No. 20,* pp. 105-108, pl. 16, figs. 1, 2, 3, 4, 5; pl. 17, figs. 2, 4, 5.

Y. Otuka (1934) assigned some of the scallops from the Shizukawa formation to *Amussiopecten praesignis* (Yokoyama) and *Pecten iitomiensis* Otuka, but as the result of the writer's study, it becomes clear that they represent the same species, *Amussiopecten iitomiensis* (Otuka).

The original description of "*Pecten iitomiensis* Otuka" (in Japanese) is as follows. "This new species resembles *Pecten naganumana* Yokoyama, but the former has a flatter and higher shell than the latter. *Patinopecten yessoensis* Jay is allied to the present species, which has narrower and shallower interstices.

The measurements are as follows;

	height	length	thickness	
Specimen 1; (R. G. No. 1879)	50	47	6.5–5 mm.	(one valve)
Specimen 2; (R. G. No. 1880)	57	49	6.5 mm.	(one valve)

Ribs 14–15 in number.

The apical portion of this species is flat and resembles *Pecten laqueatus* Sowerby. Ears are simple and triangular; byssal notch indistinct. Radial ribs rounded and become gradually flatter and obsolete towards the ventral and the lateral margins. The interstices narrower than the ribs themselves."

The specimens collected by the writer from the Shizukawa sandstone take the following description.

Shell large, rather thin, varying in outline from opithocline to prothocline through orthocline. Right valve a little convex, slightly curved near the beak, provided with 12–15 low, rounded, straight ribs, which become obsolete

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Explanation of Plate 6

Fig. 1. *Amussiopecten iitomiensis* (Otuka), Topotype, Reg. No. 5312, Right valve, ×1, Loc. near Kannon-bashi, west of Hayakawa-bashi, Nakatomi-machi, Minamikoma-gun, Yamanashi Prefecture.

Fig. 2. *Amussiopecten iitomiensis* (Otuka), Reg. No. 5315, Right valve, ×2/3, Loc. Osozawa, Nakatomi-machi, Minamikoma-gun, Yamanashi Prefecture.

Fig. 3. *Amussiopecten iitomiensis* (Otuka), Reg. No. 5316, Right valve, ×1/2, Loc. Same as above.

Fig. 4. *Amussiopecten iitomiensis* (Otuka), Reg. No. 5317, Right valve, ×2/3, Loc. West of Oharazima, Nakatomi-machi, Minamikoma-gun, Yamanashi Prefecture.

Fig. 5. *Amussiopecten iitomiensis* (Otuka), Reg. No. 5324, Inner surface of right valve, ×2/3, Loc. Osozawa, Nakatomi-machi, Minamikoma-gun, Yamanashi Prefecture.

Fig. 6. *Amussiopecten iitomiensis* (Otuka), Topotype, Reg. No. 5311, Left valve, ×1, Loc. Near Kannon-bashi, west of Hayakawa-bashi Nakatomi-machi, Minamikoma-gun, Yamanashi Prefecture.

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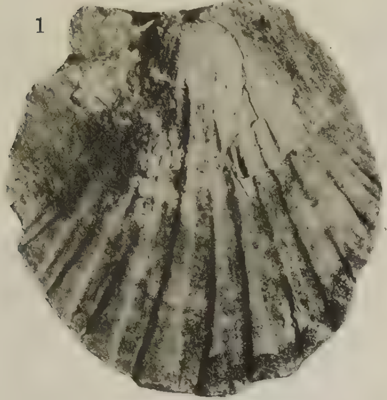

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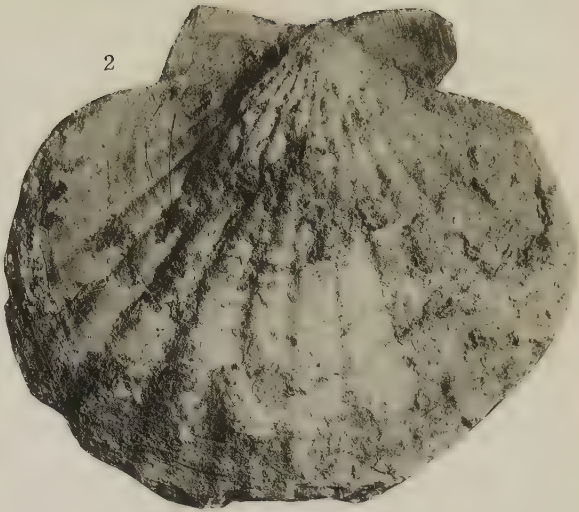

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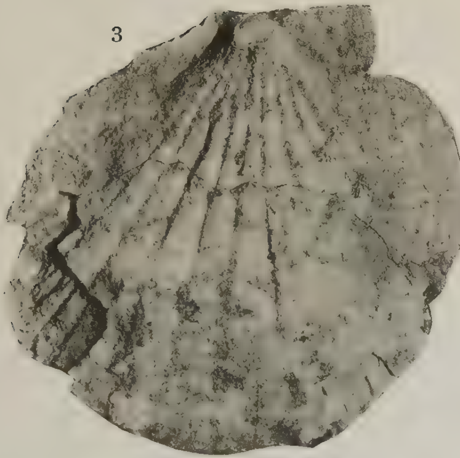

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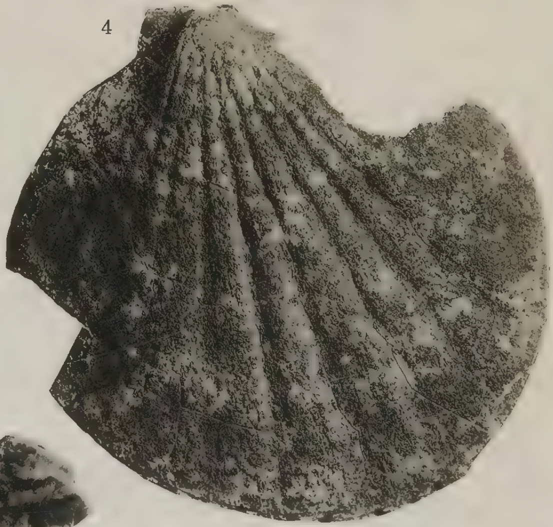

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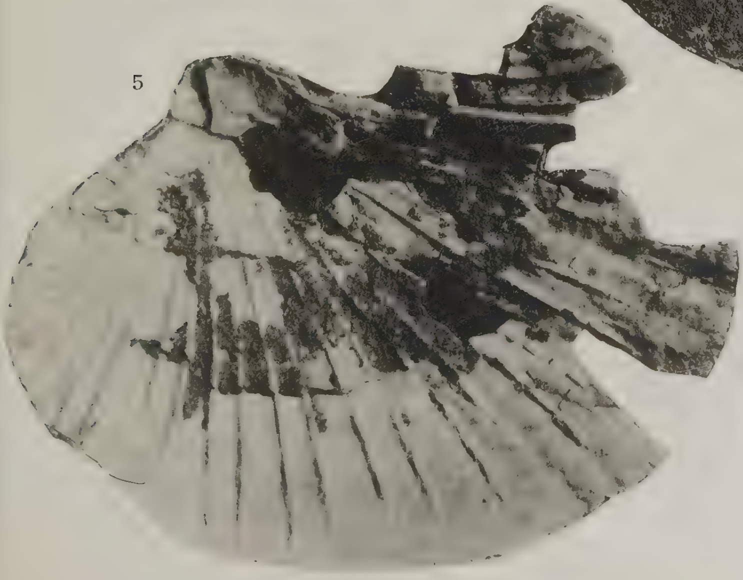

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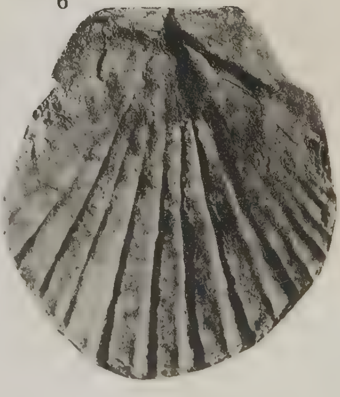

Table 3.

Reg. No.	L.	H.	D.	Hinge line	H/L	Hinge/L	No. of Ribs	Apical Angle	*Inequilarity**	Valve
5311	48	50	10	28	1.04	.58	13	105	.44	R.
5312	42	48		22	1.10	.52	12	112	.52	L.
5315	107	99	9		.93		13	102	.62	R.
5316	134	119	7	60	.87	.45	14	115	.43	R.
5317	118	98	7	48	.83	.41	15	120	.46	R.
5318				55			11	120		L.
5319	89	76	8		.84		14	115	.45	R.
5320	52	41	5	26	.79	.50	15	120	.40	R.
5321	71	59	7		.83		14	120	.54	R.
5322	62	49	5	26	.79	.42	13	120	.42	R.
5323	50	42	3	30	.84	.60	15	120	.49	R.
5324	141	98	12		.70		13	137	.33	R.
5326	69	59	7		.85		15	117	.40	R.
5327							13	100		R.
5328	45	45	8		1.00		12	110	.38	R.
5329	94	71	7	37	.76	.39	15	130	.59	R.
5330	56	57		28	1.09	.52	11	110	.47	L.
5332	35	35	4	20	1.00		14	100	.50	R.
5333	81	81			1.00		14	110	.46	R.

gradually towards the ventral and the lateral margins; interstices much narrower than ribs themselves. Internal ribs have inconstant width and prominent ridges on both sides near the ventral border. Concentric striations weak but distinct. Ears subequal, anterior one being somewhat wavy and with weak but distinct byssal notch. Hinge line wing-like. Left valve flat, ornamented with 11-12 round-topped, radial ribs and a few interstitial riblets; interstices broader than ribs at the upper half of the disc; on the other hand, near the ventral side interstices as wide as ribs.

The measurements of the selected specimens are shown in Table 3 (in mm.).

Remarks :—This species is characterized by the rather thin, large shell which is provided with 11–15 rounded, straight, radial ribs. The ribs become obsolete at the ventral and the lateral margins, and are much broader than the interstices. The present species, as was pointed out by T. SHUTO (1955), has variable characters. Above all, the shell outline varies from opithocline to prothocline through orthocline and from .33 to .62 in *Inequilarity*.

Amussiopecten hyugaensis SHUTO is synonymous with this species.

A. praesignis (YOKOYAMA) is closely allied to the present species, but the latter has less numerous, rounded, radial ribs which never split into riblets and the interstices are much narrower.

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* *Inequilarity* :—This term is proposed by the writer to express a degree of an inequilateral shell. We draw a perpendicular from the beak to length-line *ab*, where the point *a* is at the anterior, and call a point of intersection *c*. Here, *ac*/L is defined as "*Inequilarity*".

A. planicostulatum (NOMURA and NIINO) is also allied to the present species, but the latter has less numerous ribs which never split into riblets.

Geological significance :— T. SHUTO has stated that "*A. hyugaensis*" occurs from the lower part of the Miyazaki group in south-east Kyushu, while *A. praesignis* is found from the upper horizon of the Takanabe member. Considering the above mentioned facts and the morphological relationship of these two species, it may be suggested that *A. praesignis* is derived from *A. iitomiensis* (*A. hyugaensis*). If this is true, the Shizukawa sandstone (OTUKA 1955) in Yamanashi Prefecture which yields *A. iitomiensis* may be Upper Miocene in age. Unfortunately, the writer has had no chance to examine *A. praesignis* (?) reported from the Sagara formation, but in the future, he wishes to collect and study those specimens and to clarify the phylogenetic relationship between *A. praesignis* and *A. iitomiensis*.

Y. OTUKA (1938) stated that the fauna occurring in association with *A. praesignis* and *Venericardia panda* (YOKOYAMA) is characteristic in the Lower Pliocene deposits along the Pacific coast of Japan. The genus *Amussiopecten*, therefore, is to be considered to have valuable stratigraphic significance.

Localities and horizon :—Osozawa and near Kannon-bashi in Nakatomi-machi and Oharazima in Minobu-machi, Minamikoma-gun, Yamanashi Prefecture; Shizukawa sandstone.

Repository : — The Geological and Mineralogical Institute, Tokyo University of Education. Reg. No. 5311–5313, 5315–5324, 5326–5334.

*Distribution*** :— Lower part of the Miyazaki group.

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* The specimen recorded by S. NOMURA and H. NIINO from the Nawachi gold mine, Izu Peninsula may be assigned to this species, considering that it has less numerous ribs.

Explanation of Plate 7

Fig. 1. *Amussiopecten iitomiensis* (OTUKA), Reg. No. 5318, Left valve, ×2/3, Loc. Osozawa, Nakatomi-machi, Minamikoma-gun, Yamanashi Prefecture.

Fig. 2. *Amussiopecten planicostulatum* (NOMURA and NIINO), Reg. No. 5400, Right valve, ×1/2, Loc. Abuzuri, Zushi City, Kanagawa Prefecture.

Fig. 3. *Amussiopecten planicostulatum* (NOMURA and NIINO), Reg. No. 5399, Right valve, ×1/2, Loc. Same as above.

Fig. 4. *Amussiopecten planicostulatum* (NOMURA and NIINO), Reg. No. 5396, Left valve, ×1, Loc. Same as above.

Fig. 5. *Amussiopecten praesignis* (YOKOYAMA), Reg. No. 5391, Right valve, ×1/2, Loc. In the tunnel near Nishiyama, Haranoya-mura, Ogasa-gun, Shizuoka Prefecture.

Fig. 6. *Amussiopecten praesignis* (YOKOYAMA), Reg. No. 5392, Right valve, ×1/2, Loc. Same as above.

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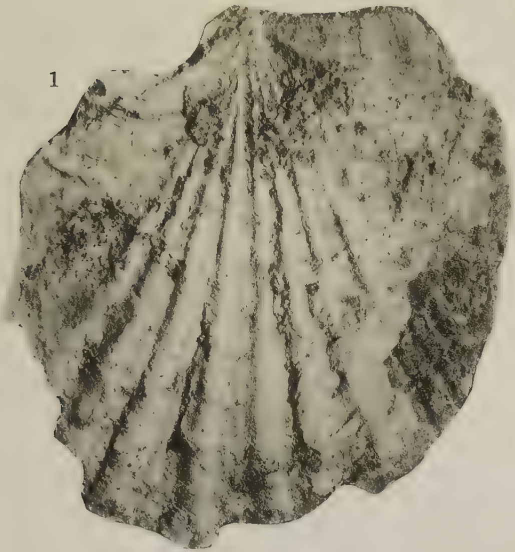

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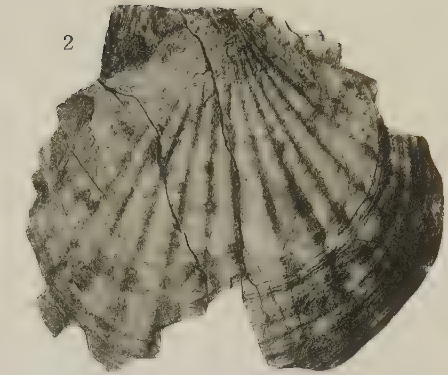

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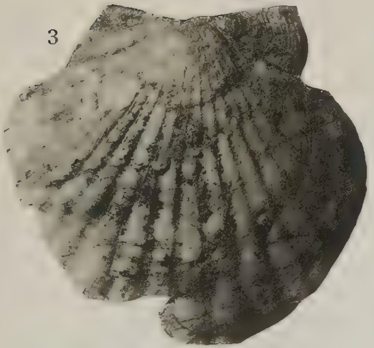

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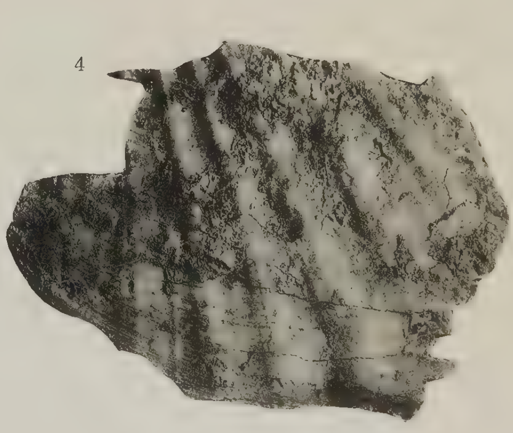

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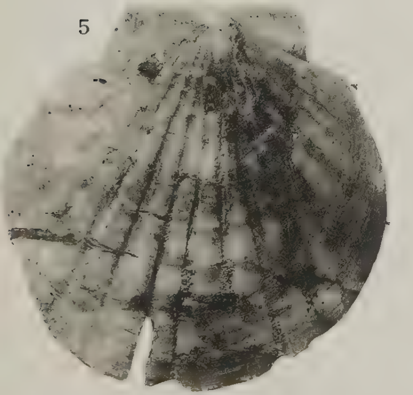

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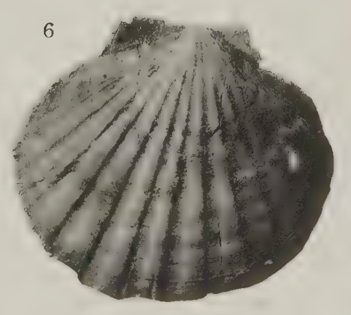

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PROCEEDINGS OF THE PALAEONTOLOGICAL SOCIETY OF JAPAN

「日本古生物学会 1956 年々会」1957 年2月9日東京大学理学部地質学教室に於いて開催した（参会者38名)。年会に於ける講演者並びに講演題目は次の通りである。

1. Lower Permian fusulinids from the Shiroiwa Limestone, North-western part of Ôme, Nishitama-gun, Tôkyô-to, Japan (代読) ……………Sumio Sakagami and Toshikazu Omata
2. Preliminary Report on the Classification of the Halysitidae……………Takashi Hamada
3. 福井県鎌原谷および大伊勢谷中部に含 *Favosites* 石灰岩発見とその基盤構造にもつ意義 (代読)……………前田四郎
4. 北上山地産 *Sciophyllum* (四射珊瑚)(代読) ……………湊 正雄
5. Occurrence of Jurassic *Burmirhynchia* Buckaman from Japan …Akira Tokuyama
6. On some Triassic Spiriferinids from the Sakawa Basin, Prov. Tosa…Akira Tokuyama
7. On some New Species of *Patinopecten* from the Tertiary formations of Chichibu Basin, Saitama Prefecture, Japan ……………Saburo Kanno
8. The Molluscan Fauna from the Environs of the Zenkôji Hotspring, Nagano Prefecture, Japan…Saburo Kanno and Tsuneo Tomizawa
9. Cretaceous Pennatae Trigonians in Japan ……………Mitsuo Nakano
10. *Radulonectites*, a New Pectinid Genus from the Liassic Kuruma Group in Central Japan……………Itaru Hayami
11. Liassic *Chlamys*, *Camptonectes* and other Pectinids from Kuruma Group in Central Japan……………Itaru Hayami
12. Additional New Genera and Species of Trigonians from the Jurassic of Soma, North Japan …Teiichi Kobayashi and M. Tamura
13. Some Trigonians from the Hida Plateau Region, Central Japan……Teiichi Kobayashi
14. *Nipponitrigonia* and *Rutitrigonia* in Japan ……………Teiichi Kobayashi
15. Trigonian Faunule from Mindro in the Philippines ……………Teiichi Kobayashi
16. Bemerkungen zur systematischen Stellung von *Monotis*, *Entomonotis*, *Claraia*, *Eumorphotis* und einigen anderen Triasgattungen der "Pteriidae" (代読) …Koichiro Ichikawa
17. Cambrian Fossils from Peninsular Thailand ……………Teiichi Kobayashi
18. 葛生層産出の化石食虫類の一新種について ……………島岡善和
19. Some Notes on a rare Species *Triceratium simplex* J. Brun (代読)…Wataru Ichikawa
20. 東京第四紀層産花粉化石 ………島倉己三郎

特別講演　第 4 回国際古生物学連合に出席して（幻灯使用) ……………遠藤隆次

会則変更

1957 年 2 月 9 日，東京大学で開かれた日本古生物学会年会席上次の如く会則第1条及び出版規定 I, 3 が改正された。

会則第1条　本会は日本古生物学会という。〔"日本地質学会の部会で" を削除〕

出版規定 I, 3　原稿（挿図・地図・附表を含む）は刷上り原則として 8 頁〔規定変更前は 6 頁〕（タイプライター用紙 18 枚以内〔規定変更前は 14-15 枚〕）を限度とする。

日本古生物学会例会通知

	開催地	開催日	講演申込〆切日
第66回例会	秋田大	1957年6月15日	1957年5月30日
第67回例会	京大	1957年9月28日	1957年8月31日

1957年4月25日 印刷
1957年4月30日 發行
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Change in Constitution

On the occasion of the Annual Meeting of the Palaeontological Society of Japan, held at Tokyo, February 9, 1957, it was decided upon to revise Article 1 and Regulation for Publication 3 as indicated (in italic) below.

Article 1. Name. The Society shall be known as the Palaeontological Society of Japan. ("The Society is a section of the Geological Society of Japan" will be omitted.)

Regulations for Publication.

3. Manuscripts (includiue of text-figures, maps and tables) will be limited to *8* printed pages (*less than 18* type-written pages).